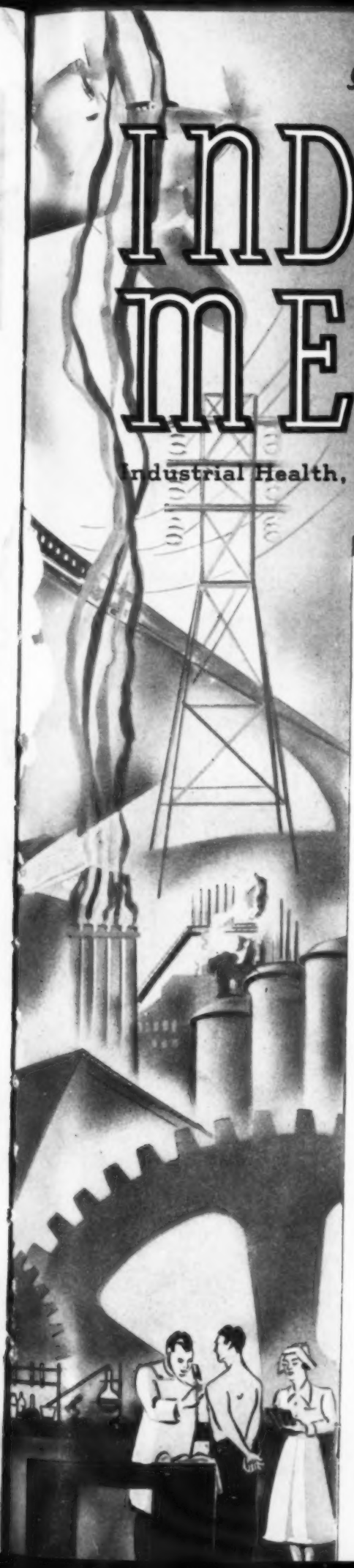

*Industrial Hygiene Section*

# INDUSTRIAL MEDICINE

Industrial Health, Occupational Diseases and Traumatic Surgery

*October, 1942*

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**First Aid**
— By Whom, With What, and How Much?

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— A Survey —

**An Acute Lead Hazard**
— Control under Wartime Conditions —

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— Methods of Treatment —

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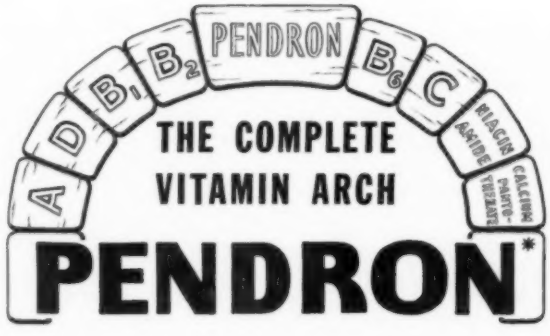


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BY WAY of comment on the passing of time, the first issue of INDUSTRIAL MEDICINE made its appearance 10 years ago this month. Notable is the fact that practically every industrial physician and surgeon who was a subscriber then is a subscriber now. . . . WITH reference to the practice of industrial medicine, we have often strongly affirmed the opinions of others and added some of our own to the effect that (1) *all* physicians should make it their business to know something about industrial medicine, and (2) *all* industrial managements should make it their business to give the physicians a chance to use what they learn. Not, of course, because of anything we said, but in response to the needs of the times, there are many indications that both the physicians and the managers are waking up. That fact is the principal significance of this month's news of the field. . . . DR. LEGGO (page 481) has some strong and timely words of caution in the matter of plant first aid. Under present conditions, first aid will be about all that many small concerns will be able to accomplish quickly. It is incumbent on all of them, as well as on all other first aid setups, to insist on proper personnel, proper methods, proper equipment and proper supervision. . . . THE editorial (page 486) more or less explodes a subject about which, while many are talking, a vastly greater number are quietly and seriously thinking. In line with the little paragraph on page 470, why not canvass the deferred lists for those who are absent *from* war work as well as those who are absent *in* it—"those who," in the first instance, applying to all incumbents of jobs that can be filled by women and older men. War workers in the main are human, loyal, patriotic, willing to cooperate under cooperative circumstances. Their cooperation can be enlisted much more effectively than it can be drafted.

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DR. OTIS MARSHALL has resigned from the Medical Service of the American Red Cross to accept, for the duration, the position of Director of Health in Industrial Surgery for the Ecusta Paper Corporation, Brevard, North Carolina.

DR. CLIFFORD KUH, New Haven, chairman of the committee on industrial health of the Connecticut State Medical Society, has resigned to become director of the bureau of industrial health for the California State Department of Health.

DR. GEORGE SMITH, medical director, Scovill Manufacturing Co., Waterbury, Connecticut, has added a third industrial hospital to the company's medical service facilities. The new hospital is fully equipped, is staffed by registered nurses, and is in service daily except Sundays from 7:00 A.M. to 11:00 P.M.

DR. DONALD C. CONZETT, of Dubuque, Iowa, has recently been appointed commanding officer of the Medical Officer Recruiting Board for Iowa with headquarters at 201 Federal Building, Cedar Rapids. MAJOR CONZETT replaces COLONEL JOHN I. MARKER, who has been given charge of operations and training for all Medical Corps personnel in the Seventh Service Command. COLONEL MARKER is stationed at 916 Federal Office Building, Omaha, Nebraska.

DR. FELIX J. UNDERWOOD, Mississippi State health officer, in *Jackson News*, tells how the State Board of Health has strengthened its program of disease control in certain areas where emergency industries have brought new workers into an already overcrowded community. In such communities, constant supervision of water, sewage, food and milk has been stressed; venereal disease clinics are held at hours designed to meet the workers' convenience; immunizations against


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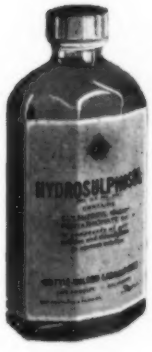

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DR. LOYAL DAVIS, head of the surgical department of Northwestern University Medical School, Chicago, and editor of *Surgery, Gynecology and Obstetrics*, has been commissioned a lieutenant colonel in the U. S. Army Medical Department and assigned to duty as consultant in neurosurgery in the Surgeon General's Office, Washington, D. C. Dr. Davis served in the first world war and from 1922 to 1924 was associated with the late Dr. Harvey Cushing of Boston. He then came to Chicago as associate professor of surgery at Northwestern and in 1932 became head of the department of surgery.

DR. ROSCOE N. GRAY, Surgical Director, Aetna Casualty and Surety Company, of Hartford, Connecticut, addressed the annual convention of the Utah State Medical Association in September on "Industrial Diseases," and on "The Industrial Surgeon and the Insurance Carrier." He also participated in a chest interpretation clinic with DR. WILLIS S. LEMON, of the Mayo Clinic, and DR. ADOLPH J. KAMMER, Medical Director, Inland Steel Company.

DR. SIDNEY R. GARFIELD, in charge of hospital and first aid stations in the shipyards at Richmond, California, has a new modern field hospital provided by the maritime commission for the care of shipyard workers in Richmond. This is in addition to "the Permanente Foundation hospital, which has been opened in Oakland for shipyard workers. The purpose of the foundation is fourfold. First, it will establish hospital facilities for war workers which are

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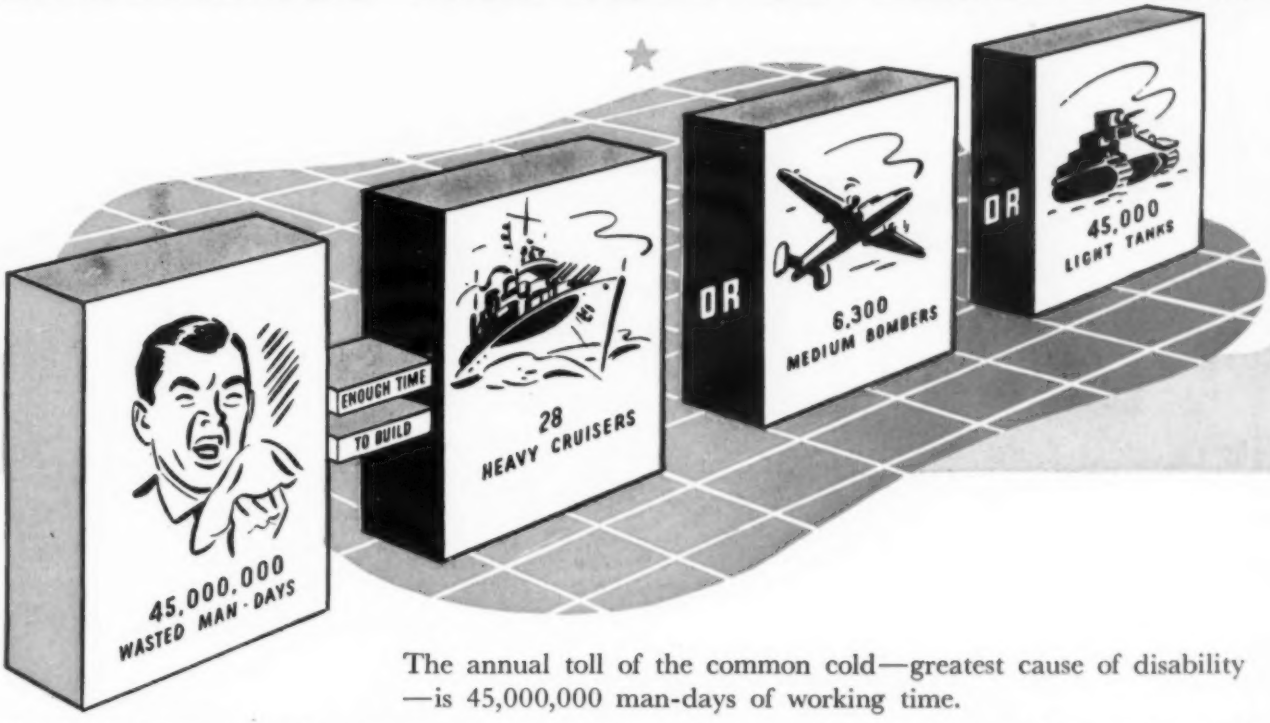


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—Canad. M.A.J. 41:493 (1939)

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—Indust. Med. 8:350-351 (1939)

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—Jour.-Lancet 60:319-324 (1940)

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—Indust. Med. 9:530-533 (1940)

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not now available; second, it will provide funds for research into industrial medicine; third, it will set up a fellowship for the training of physicians and nurses in special duties; and fourth, it will provide medical services for rural areas."

DR. LEO LA DAGE, of Davenport, Iowa, addressed the Davenport Exchange Club on Friday, August 7, on the subject "Exposing Some of the Myths about First Aid."

IN THE offices of the State Medical Chairmen for the Procurement and Assignment Service, there are lists of physicians who have indicated their willingness or desire to go into industrial medicine. The names of these physicians may be secured by writing to the State Medical Chairman in the state in which the industry is located.

DR. GEORGE C. RUHLAND, health officer of the District of Columbia, recently issued a letter to local shoe dealers requesting their cooperation in preventing stockingless women from trying on shoes in order to discourage spread of "athlete's foot."

DR. B. V. MORKOVIN, head of University of Southern California's psychology clinic, who has been working in cooperation with the Federal government in a program to rehabilitate, train and place the physically handicapped for jobs in in-


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A clinical appraisal of the literature on ERTRON therapy to date again emphasizes the value of *Ertronization* in arthritis.

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## SELECTION OF CASES . . . .

Reporting on 200 ERTRON-treated cases, Snyder, Squires, Forster, Traeger and Wagner (Indust. Med., 7:11, 295-316, July, 1942) found a higher degree of improvement in rheumatoid arthritis than in osteoarthritis. The rheumatoid type is by far the more common, but the clinician should keep this variation of results in mind when outlining therapy and prognosis.

## TO ASSURE SAFETY . . . .

No toxicity was found in 98 cases reported by Steck (Ohio State M. J., 38:5, 440-443, May, 1942). As a precautionary measure, however, the dosage should be gradually brought up to the maintenance level (Snyder and Squires: New York State J. Med., 41:23, 2332-2335, Dec. 1, 1941).

## ADEQUATE DOSAGE . . . .

The necessity for adequacy of dosage in ERTRON therapy is to be noted. The consensus of opinion is that a maintenance dosage of 6 capsules daily (occasionally more) should be continued for six months or longer, unless considerable improvement occurs within a shorter period.

## ADJUNCTIVE THERAPY. . . .

In a clinical study of over 300 cases, it was pointed out that each patient presents a separate and distinct problem (Farley, R. T., Spierling, H. F. and Kraines, S. H.: Indust. Med., 10:8, 341-352, August, 1941), and must be treated nutritionally, psychologically and physically to obtain maximum benefit.

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*This spread appearing in Oct., 1942 issues Am. J. Med. Sciences, Current Med. Digest, Illinois Med. J., Industrial Med., Medical Economics, Military Surgeon, Modern Med., N. Y. St. J. Med., Tri-State Med. J., J. Am. Osteo. Assn.; also in b. & w. page in Oct., 1942 issues J. Bone & Joint Surgery, and Am. Prof. Pharmacist; Nov., 1942 issue, Bull. N. Y. Academy of Med.*

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dustry, has placed 1579 "handicaps" in productive jobs since December 7, and an estimated 50% of them have gone into essential war industries. North American Aviation employs 12 deaf mutes; 27 persons having deformities resulting from paralysis, accidents or birth; five one-legged men, two one-armed men; six men lacking one or more fingers, and one victim of a nervous disorder as an inspector. Approximately 100 men with "definite handicaps" and many others with "minor physical handicaps" are working as longshoremen in west coast ports. Other "handicaps" are employed in shipyards and in the furniture industry.

—*Los Angeles Times*, August 16, 1942.

DR. M. H. KRONENBERG, Chief, division of industrial hygiene, Illinois Department of Health, addressing a meeting of the women's division of the Illinois State Council of Defense at Chicago, September 18, on "The Problem of Nutrition in Industry," told his audience that 71% of the men in industry have poorly balanced diets.

JOHN R. FORTIN, Personnel Director, Todd-Bath Shipbuilding Corporation, South Portland, Maine, addressing the final session of the 15th annual State Safety and Industrial Health Conference at Portland, September 18, said that "false rumors" that the South Portland ship yards

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**The Military Surgeon, Vol. 89, No. 1, p. 5, July, 1941*
*J.A.M.A., 93:1110—October 12, 1929*
*Brückner, H.— Die Biochemie des Tabaks, 1936*

★

"THE CIGARETTE, THE SOLDIER, AND THE PHYSICIAN," The Military Surgeon, July, 1941. Reprint available. Write Camel Cigarettes, Medical Relations Division, 1 Pershing Square, New York City.

**Camel** THE CIGARETTE OF COSTLIER TOBACCOS

# How long before it leaks?

## HERE IS THE ANSWER . . .

ALL syringes leak in due course. Your only concern is the amount of usable service you get before leakage occurs.

Syringes that are tight at only one or two spots leak quickly. Syringes that are not carefully fitted leak quickly. Syringes that are not individually tested for back-flow over the entire length of the scale may also leak quickly.

For the utmost in service before leakage, the syringe you use must be made of resistance glass. It must be tested for back-flow *with plunger revolving* for the entire length of the scale. These details represent a small cost to the manufacturer, but a big saving to you.

You must wear out a B-D Syringe before it leaks. It will not leak prematurely by reason of faulty manufacture.

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*Made for the Profession*

**B-D Syringes**

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| OF SPECIAL RESISTANCE GLASS | OF 'PYREX' | EXTRA STRONG TIP LOCKS WITH B-D NEEDLES |

**BECTON, DICKINSON & CO., RUTHERFORD, N. J.**


were "man killers" were completely false; that there had been but four fatalities in both yards since March, 1941, and the accident rate at both was less than that of any other yard in the eastern seaboard area.

DR. JAMES H. BIRAM, medical director, Colt's Patent Fire Arms Manufacturing Co., Hartford, Connecticut, is responsible for the suggestion of a community "pooling arrangement" for the transfer of workers among suitable occupations, as noted in his article on "Skin Sensitivity" in INDUSTRIAL MEDICINE, August, 1942 (p. 385). According to *Connecticut Industry* DR. BIRAM'S suggestion has now become operative: "Connecticut workers whose skins are allergic to manufacturing chemicals are to be transferred from one job to another, thus conserving manpower resources. This plan is being developed by Connecticut Medical Society, Board of Education, U. S. Employment Service, Manufacturers Association of Connecticut and various individual plants and industrial physicians. So far shift of workers has been in the broad division of 'wet and dry jobs.' A machinist, for example, whose skin is sensitive to oil or some other liquid, is shifted to a 'dry' job where he can utilize his skill in an operation not requiring use of liquids."

DR. LEON SCHWARTZ, of the U. S. Public Health Service, is in charge of the health program inaugurated by the Census Bureau at its new building at Suitland, Maryland, where the medical service facilities are thus described (*Washington, D. C., Star,* September 6, 1942): "Comfortable quarters have been arranged, and the necessary examining equipment, including mobile x-ray units, has been installed. The census unit will make preplacement physical examinations, supplementing those required for employment by the Civil Service Commission, and treat illnesses or injuries among employees that develop during the day's work. In emergency cases, it will supervise the transfer of employees to the care of private physicians and hospitals. Though the new unit will give advice to employees on health matters, actual treatment will be left to their family physicians. Health records will be kept for each worker, and studies will be carried on to prevent or reduce loss of time due to occupational and other diseases. In addition to keeping an eye on the health of census workers, DR. SCHWARTZ will make frequent investigations of the cafeteria in the Suitland building. Inspections there will be made by engineers of the Division of Industrial Hygiene, National Institute of Health, to assure adequate illumination and ventilation. According to the Commerce Department, the Census Bureau is the first government agency to furnish such a complete medical and health service to its employees."

GEORGE S. BALDRY, formerly connected with the Harvard School of Public Health, has been appointed director of the Division of Industrial Hygiene for the Province of Manitoba. He will be located with the Department of Health and Public Welfare, Division of Industrial Hygiene, Winnipeg, Manitoba, Canada.

S. C. ROTHMANN, formerly Chief Engineer of the West Virginia Workmen's Compensation Silicosis Fund, has entered the Army and is serving as a Captain in the Sanitary Corps under LIEUTENANT-COLONEL A. J. LANZA, Office of the Surgeon General, War Department, Washington, D. C.

DR. WALTER JOSEPH FILIPEK has succeeded DR. CHARLES D. CLARK as medical director for Bendix Products Division, Bendix Aviation Corporation, South Bend, Indiana. DR. CLARK has been commissioned Captain in the Medical Corps.

DR. ROBERT COLLIER PAGE, Assistant Medical Director, Standard Oil Company (New Jersey), has received his commission as Captain in the Medical Air Corps, reporting for duty in the Air Surgeon's office, Washington, D. C., as of October 5.

DR. JOHN CREDE MILLER, industrial physician and surgeon, of Anderson, Indiana, died July 24, at the age of 38. He was a graduate of the Indiana University School of Medicine, Bloomington, in 1930; a member of the Madison County Medical Society and the Indiana State Medical Association, and a Fellow of the A. M. A.

# A TIMELY SUGGESTION:

## Group U-V Irradiation of Workers on the War Production Line

• Now that the Nation looks to the Medical profession for every possible help toward keeping our war workers physically fit and on the production line, routine ultraviolet irradiation would seem a timely suggestion.

As a supplement to other hygienic measures in industrial medicine, general body irradiation with mild doses of ultraviolet two or three times a week has proved highly beneficial to miners and factory workers — tending to build up resistance against respiratory diseases which exact such a heavy toll in man-hours lost to production.

Pictured above is a typical installation for this purpose. Paired G-E Hot Mercury Quartz Lamps are placed on each side of a passageway between shower-room and locker room. A moving handrail serves to correctly time the interval of exposure for each individual passing between the lamps. Requires just a few minutes, routinely, two or three times a week.

What could more effectively offset the sparse sunshine of winter months, and the pent-up existence of the majority of war workers?

Further information, including a blue-print giving details for such an installation, will be sent on request. Ask for Pub. Set No. D110.

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The terribly serious time losses from accidents can be cut materially with the use of Allantomide in treating infected wounds or burns.

Allantomide has an important two-way action. Sulfanilamide, released by the greaseless base into suppurative wounds, serves to control infection. Allantoin stimulates granulation, helps to heal wounds more quickly. Allantomide is Allantoin Ointment 2%, with Sulfanilamide 10%, and is supplied in one ounce tubes, four ounce, one and five pound jars. A trial tube is available for industrial hospitals or physicians in industrial work.

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## GENERAL

INDUSTRIAL Hygiene Foundation will hold its seventh annual meeting November 10-11, at Mellon Institute, Pittsburgh. This meeting of Foundation members, most of them companies producing war material, has as its theme "Health Arms the War Workers." The program, studded with industrial health specialists, will drive for action in reducing the precious days war workers are losing from illness and non-industrial injuries. Roughly, an average of 350,000 work days are being lost daily at a time when our war production schedule calls for a plane every eight minutes and a tank every 12 minutes.

CONNECTICUT Health Bulletin summaries of occupational disease experience for June and July, 1942, show these results: Dermatitis (all classes), June—86 cases, July—131 cases; Silicosis, pneumonconiosis and tuberculosis, June—four cases, July —12 cases; Poisoning, June—three cases, July—two cases.

SAVE Manpower for Warpower" will be the theme of the thirty-first National Safety Congress and Exposition, to be held in Chicago, October 27-29. The entire program, covering every phase of safety with 175 sessions and program participants, will be centered on the problem of stopping accidents that delay victory by slowing production, impeding the movement of troops and supplies and wasting manpower, material and time.

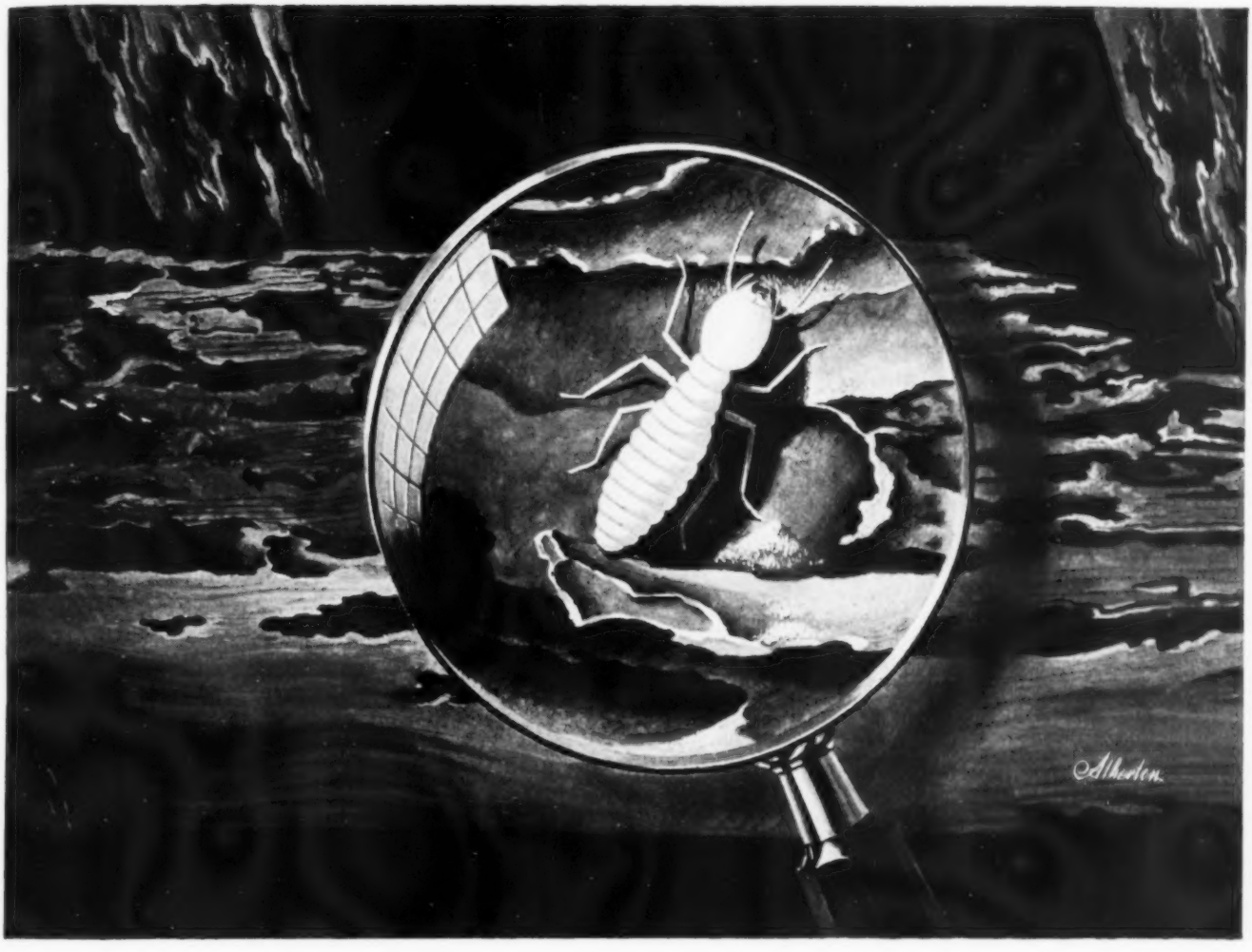
A SURVEY made by officials of the National Institute of Health shows that 6,000 more employees are required at present by health departments alone to care for wartime activities. Of this number, 40% are public health nurses and 9% are physicians. Private and public hospitals report that nearly 20,000 employees, who are not physicians, are needed now and twice that many will be needed after expansions have taken place. Of this total, 45% are graduate nurses and 21% are student nurses.

MORE claims for Workmen's Compensation were received by the State Industrial Commission during July than in any other month in the history of the Commission, Chairman WILL T. BLAKE has reported. July claims numbered 30,160, the report disclosed, 125 more than the previous record total for one month, received in October, 1941. The July figure is an increase of 14.2% over the number of claims received in the same month of 1941, and 72.6% above the July, 1940, total. The Commission has received 179,802 industrial accident claims in the seven months of 1942 covered by the report, an increase of 17.5% compared with the same period of 1941. Included in the July totals were 96 death claims, eight more than were filed in June, and 24,789 claims for payment of medical expenses only, involving injuries which did not cause compensable work loss of seven or more days. Claimants were paid a total of $1,049,029.98 in compensation during July, and the Commission authorized disbursement of $473,944.43 for payment of claimants' medical, hospital and funeral bills in approved claims.

INDUSTRIAL accident deaths in Illinois increased 31% in July over the similar period a year ago, according to National Safety Council. The number of such deaths in the state was not announced, but in 26 states fatalities resulting from industrial accidents rose to 917 in July, an increase of 27% over the 720 deaths in July, 1941. Decreases in deaths were reported only in four states. Figures for July raised the national death total on the working front for seven months up to 5,311, or 15% over the corresponding period last year. Over the seven-month period deaths increased in 22 states, ranging from less than 1% in Connecticut to 48% in Minnesota and 56% in West Virginia.

A GRADUATE course in "Industrial Health and Medicine in War Time," designed principally for physicians of Connecticut, is to be offered by Yale University School of Medicine. The program will consist of 12 afternoon lecture and seminar sessions conducted by physicians and specialists in industrial medicine. The meetings will be held on Wednesdays from October 7 through December 23. The course is under the joint direction of DR. JOHN R. PAUL, professor of preventive medicine, and DR. C. E. A. WINSLOW, chairman of the department of public health. "In these days," said Dr. Winslow, "family life is centering more and more about industry. Therefore, industrial medicine will soon be required as a new specialty, and the doctor who can help both labor and management in the maintenance of a healthy working force will be more and more important."

THE number of neurotic disturbances among civilians in belligerent countries has decreased since the present war started, speakers participating in a University of Chicago Round Table broadcast on "Health in Wartime" asserted recently. The decrease was attributed to improved diet and other health habits among civilians. Participating in the broadcast were DR. DEAN CLARK, chief of the medical emergency division of the U. S. Public Health Service; DR. RUSSELL WILDER, head of the Mayo Foundation's department of medicine; and LOUIS WIRTH, professor of sociology at the University of Chicago. The experts said armed service personnel was in better health than during World



# EVEN AN ANT CASTS A SHADOW

● A single ant is frail and inconsequential, yet, magnified by numbers, its small efforts have cut the floor from under man's feet and brought the roof crashing about his head.

The common cold is likewise of little importance in itself: nearly everyone has experienced its debilitating but transient effects, and it is generally regarded as little more than a nuisance.

Nevertheless, accurate, nationwide surveys, conducted last winter, show that *one-half of all work-time lost in War Industries as a result of illness is lost because of the common cold*,[1] and, during a single four-week period, colds removed about 1,600,000 man-days of work from our industrial war effort alone.[2]

The situation with regard to the nation as a whole is described by the report that 23,000,000 persons in the United States had colds during the week ending February 24, 1942.[1]

1. Gallup, G.: American Institute of Public Opinion Survey, March 1, 1942
2. Gallup, G.: American Institute of Public Opinion Survey, Dec. 29, 1941

The incidence and severity of the common cold may be considerably reduced by oral immunization against specific bacteria believed responsible for its more acute symptoms.

*'Vacagen' Oral Cold Vaccine Tablets* are exceptionally effective because each is enteric-coated and provides the *water-soluble antigens* derived from 60,000 million *living* organisms of ten different types:

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| **Pneumococcus* (Diplococcus pneumoniae)** | **25,000 million** |
| **Streptococcus**** | **15,000 million** |
| **Influenza bacillus (Hemophilus influenzae)** | **5,000 million** |
| **M. catarrhalis (Neisseria catarrhalis)** | **5,000 million** |
| **Friedlander bacillus (Klebsiella pneumoniae)** | **5,000 million** |
| **Staphylococcus (aureus)** | **5,000 million** |

***Types 1, 2 and 3**
****Hemolytic, non-hemolytic and viridans**

'Vacagen' Oral Cold Vaccine Tablets are supplied in vials of 20, and in bottles of 100, 500, and 1,000.

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PHILADELPHIA

War I, but said 400,000,000 man days were lost among civilian workers last year, 64 times the total lost because of strikes. Many war workers are not physically fit to give a maximum effort, they said, because of a shortage of doctors and hospitalization facilities in boom towns near new war plants.

THE Industrial Hygiene Division of the New Jersey State Health Department has conducted in the last six months what amounts to clinical consultation on 250 plants. Its experts have gone into establishments employing a quarter of the industrial workers within the state. On the basis of the experts' reports, DR. WALTER J. HOUGH, division chief, has made recommendations for improvement to plant heads in 58% of plants inspected. About half the requests for consultation services come from managements.

COLONEL A. B. JOHNSON, chief of the Plant Security Branch, Office of the Chief of Ordnance, presided at a Safety and Industrial Hygiene Conference at Cincinnati, September 17-18, at which more than 100 medical directors and safety engineers from 60 arsenals and manufacturing plants in 15 states heard discussions by a dozen specialists on industrial health and safety regarding the well-being of war workers. Routine physical examinations were urged by several physicians to keep up the general health of workers and to detect very early toxic effects of poisons. Such examinations have a marked effect in maintaining health of TNT workers, DR. W. D. NORWOOD, medical director of the Kankakee Ordnance Works, Joliet, Illinois, told the conference. The war plant physicians were advised by DR. MAX R. BURNELL, of Flint, Michigan, that all pre-employment examinations of women applicants should be made with the idea of placement in mind and not on the basis of physical acceptance or rejection. The many different types of work that women in industry have successfully carried out makes such an attitude tenable, he asserted. DR. R. H. FLINN, U. S. Public Health Service, said that a nation-wide survey revealed the four principal causes for rejecting applicants for war jobs were hernia, defective eyesight, heart murmurs and orthopedic defects.

IN SAN DIEGO, California, the League of Women Voters in recent meetings has been hearing an "Outline of Industrial Hygiene."

EXECUTIVES of all four companies — North American Aviation, Douglas, Vultee and Lockheed-Vega — said they liked women workers and wanted more of them. How about the women's home problems? Well, Douglas is opening a nursery to take care of the children.


*Faultless Equipment...*

**will lighten your burden on the civilian front**

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STANDARD FOR BLOODPRESSURE

While the armed services continue to draw heavily upon the ranks of professional men, there remain thousands of physicians who must assume the increased burden of protecting the health of the civilian population. Now, more than ever before, the constant serviceability of equipment is important . . . today, quality counts!

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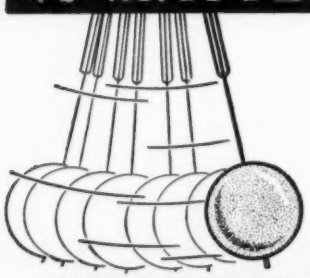
# A MATTER OF SECONDS!



TO COMPLETE A URINE-SUGAR TEST WITH

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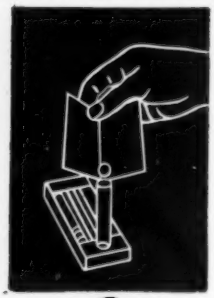
SIMPLE • SPEEDY • DEPENDABLE • ECONOMICAL

INVOLVES THESE THREE SIMPLE STEPS—

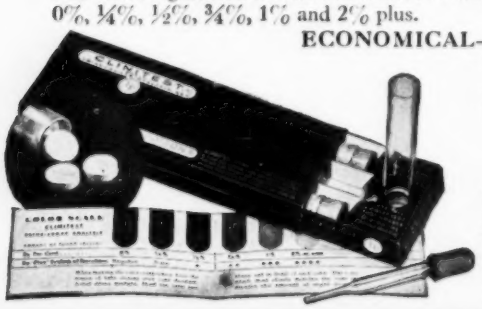
1 5 drops urine *plus* 10 drops water



2 Drop in tablet

3 Allow for reaction and compare with color scale

**DEPENDABLE**—CLINITEST Tablet Method is based on same chemical principles involved in Benedict's test—*except*—no external heating required, and active ingredients for test contained in a single tablet. Indicates sugar at 0%, ¼%, ½%, ¾%, 1% and 2% plus.



**ECONOMICAL**—Complete set (with tablets for 50 tests) costs patient only $1.25. Tablet Refill (for 75 tests)—$1.25.

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ONE should go to medical meetings seeking general information and particularly in quest of inspiration. When the speaker tells of his own difficulties and how he solved them; or he discusses other people's problems and how they were unraveled, the practitioner should be inspired to go back and to meet once again his own points to be solved with a better will and determination.

—*J. Med. Assoc. Georgia*, August.

ACCORDING to the Cincinnati Vitamin Company, an effective means adopted by many of the nation's largest plants to combat absences is the distribution of vitamins in capsule form to plant employees. Results achieved are declared to be eminently satisfactory, having in some instances reduced the volume of absences to a record low. Not only has absenteeism been curtailed by the use of vitamins, but in many cases increased production efficiency has been accomplished. A large manufacturing plant, for example, suffered a relatively high percentage of rejections of parts and examined its workmen for vitamin deficiency. Specific treatment over a period of several months resulted in a reduction of as much as 75% in the number of pieces rejected. For one person, the average percentage of rejections was 1.7% prior to treatment. Four months later it had dropped to 0.2%. The workmen also reported much greater eye comfort, and in many instances were improved in general health.

—*Occupational Hazards*, September.

DR. R. M. WALLS gives the results of studies which show that only 13.8% of industries which answered a questionnaire on the subject maintain a dental service. Only one company in 10 employing more than 500 people maintains any dental service at all. An ideal dental service, says he, should have a system of complete and accurate records of the oral conditions of all employees; every applicant for work should have a mouth examination and every employee should be examined every six months. Examinations should include bite wing diagnostic films and a prophylaxis. The worker should be referred to a dentist in private practice for treatment.

—*Dental Survey*, September, 1942.

ONE thousand labor management production drive committees in war contract plants throughout the nation are making health conservation an essential part of the production drive through organization of industrial hygiene and medical services in the plants and through attention to public health services and medical facilities in their communities. This program was initiated by Charles Taft, assistant coordinator of defense health and welfare services, as the result of a joint meeting of the National Conference of Government Industrial Hygienists with the Subcommittee on Industrial Health and Medicine of the Health and Medical Committee. The management production drive committees received a letter signed by the chairman of the War Production Board, the chairman of the War Manpower Commission, the under secretaries of the Army and the Navy, the lease-lend administrator, and the chairman of the Maritime Commission, emphasizing the importance of health activities.

—*Mod. Med.*, September, 1942.

IN THIS country there are 1,000 serious eye injuries per day—all of which, except a possible 20, are preventable. This means that most of the accidents occur through the carelessness of the persons hurt. If you are careless no one can protect you . . . At Powers, during the past eight years, we have had only five accidents to eyes that might have threatened sight, but they were quickly reported and efficiently treated by the doctor, and there has not been even a fraction of loss of vision due to these injuries.

—*Powers News*, Powers Dry Goods Company, Inc., Minneapolis.

COMPULSORY disability insurance for workers has been instituted in Rhode Island. Not to be confused with compulsory health insurance, the Rhode Island plan will pay benefits to employees for wages lost during time off work for sickness. Payroll deductions of 1½% will provide the funds from which these benefits will be paid. The plan went into effect June 1, but benefits will not be paid before April 1, 1943. After a one-week waiting period, sick workers may be paid weekly benefits varying from $6.75 to $18. Maximum amounts to be paid in one year vary from $34 to $364.50, depending on earnings record and the duration of

*Harmony*

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♪ Tune up your prescription with "Lixa-Beta - q. s." When you want to combine vitamin $B_1$ therapy with specific medication, Lixa-Beta will prove a delightfully palatable vehicle that contains 1600 U. S. P. Units of vitamin $B_1$ to the fluidounce. It provides a "common carrier" for most drugs, both soluble and insoluble as well as aqueous and oily substances. Why not give it a trial in your next prescription?

If you would like to obtain a complimentary supply and a list of drugs compatible with Lixa-Beta, please write a request on your letterhead to the Department of Professional Service.

*Lixa-Beta* is supplied in 8 ounce, pint and gallon bottles.

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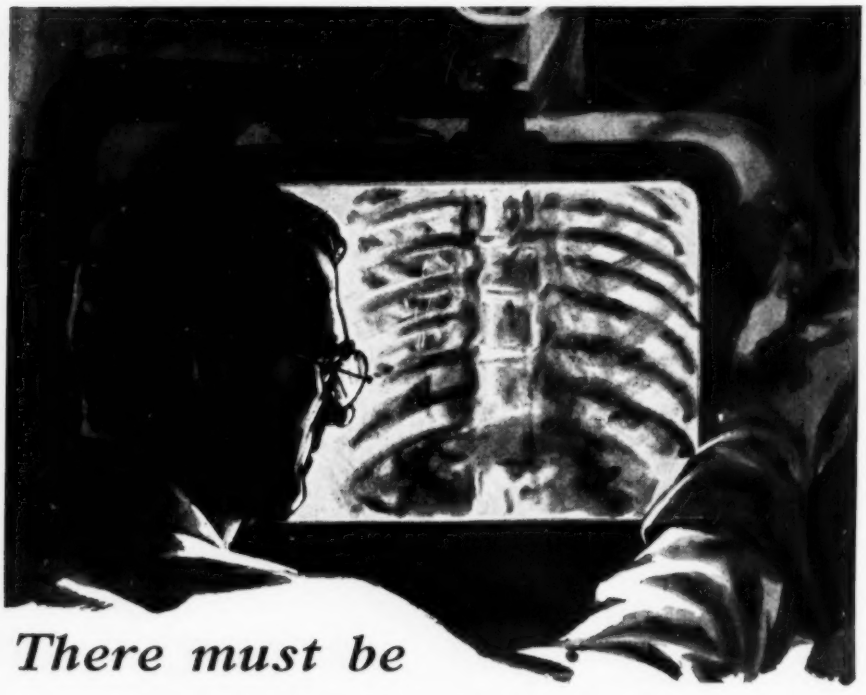

*There must be*

**NO "BLACKOUT" HERE!**

X-Ray today has many newer roles than that of assisting the medical profession. Flashing through inches of steel to reveal interior flaws in a pressure vessel . . . guarding against weak spots in a battlewagon's armor plate . . . lifting the mask from doubtful portraits by an "old master".

But still *the most important* is the day-by-day job of X-Rays in preserving health and combating disease. Today, this job takes on new significance. For, as essential as the strength of our fighting men at the front is the health of our home army who forge their weapons.

The fluoroscope has a vital part assisting you in the nation's health program. And the X-Ray equipment and supply manufacturers have a vital responsibility in maintaining the quality and quantity of your "weapons".

Ever mindful of its obligation to the medical profession in both military and civilian services, Patterson has increased its vigilance over every step of production. Research and manufacturing facilities are keyed to the demands of the war emergency. And so, Patterson Screens in all types of service, and under every operating condition are giving the unexcelled performance expected of them.

PATTERSON'S facilities devoted 100% to Public Health and Defense of the United Nations

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**Patterson X-Ray Screens**

illness. The law does not provide that any portion of the benefits must be used to pay medical expenses.

—*Ohio State M. J.*, September, 1942.

THE Medical Society of the State of New York announces "Industrial Health Teaching Day" at Syracuse University College of Medicine, Syracuse, September 26, under the auspices of local and state agencies. The program will include the following speakers:

FRIEDA S. MILLER, Albany, Maintaining the Health of the Worker in the War Effort.

DR. LEON H. GRIGGS, Syracuse, Industrial Dermatoses.

DR. FORREST O. J. YOUNG, Rochester, The Care of Soft Tissue Injuries.

DR. DONOVAN J. MCCUNE, New York, Food Requirements for Health.

DR. JAMES H. STERNER, Rochester, Toxic Effects of Some Newer Industrial Materials.

NURSES are essential in all plants doing war work, for the health of the workers directly affects the output. Smaller plants, an authority on the subject tells us, really need well-trained nurses more than larger ones, for the latter usually have medical services for the guidance of less experienced nurses and employees in the proper way to keep every one in the best of physical condition. Our informant goes on to say that in some plants nurses are doing work that easily could be done by women who have not had nursing training and experience. She suggests, at this time of crucial need for trained nurses near the battle fronts, that every employer of industrial nurses make sure that his nurses are not doing work that could be done by fewer graduate nurses and some assistants. This would appear to be a splendid suggestion.

—"Women in War Work," *Chicago Tribune*, August 25, 1942.

THE American Academy of Physical Medicine will hold its 20th Annual Scientific Session at Hotel Statler, Boston, October 14-17, 1942. The program will be composed of clinical and scientific presentations involving techniques of importance in wartime medicine. Topics of the discussions and demonstrations include physical medicine in relation to aviation medicine, physical education, habilitation, rehabilitation, first aid, and war injuries, as well as consideration of the use of physical agents in injury and disease falling within the scope of various medical specialties. There will be symposia on poliomyelitis and electrosurgery. Encephalography, electroshock, fever therapy, and other special procedures will be discussed by outstanding authorities.

INDUSTRIAL accidents have increased only about 0.8% in Connecticut, although the number of man-hours has jumped more than 90%. Pleased with the safety measures being taken by state industrialists, Labor Commissioner CORNELIUS J. DANAHER said a much greater increase in the accident rate had been expected. He felt accidents could almost entirely be eliminated by better exercise of caution. Most of the reportable accidents are caused by the removal of guards from machinery or employee violation of safety practices.

—*Connecticut Industry.*

IN ENGLAND an effective program has been developed under the stress of the war. All establishments with more than 250 employees must maintain health services. This requirement was made compulsory by the British Ministry of Labor last year. In England, moreover, there is no financial barrier between the worker and a physician or a hospital when he is ill. Under National Health Insurance, the worker may go to any physician of his choice in time of sickness. All workers subjected to sickness are assured competent medical attention and hospital care paid from public funds, or on a voluntary prepayment basis. Effective prepayment plans have been developed in a number of our important industrial establishments and in the TVA. These plans provide not just cash indemnities, but actual medical services on a non-profit basis. Where such plans have been initiated by unions it has been possible to provide joint financing by labor and management under joint supervision without fear of dis-

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PROMT AID

hey are always ready. Especially designed and uilt to be used in physicians' and surgeons' offices, ispensaries, hospitals as well as for emergency eatment on the spot where accidents occur. Place everal in strategic locations throughout your plant.

## CABINETS

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***Save Manpower*** ***Save Time*** ***Save Money***

## 1 Portable

asily and speedily moved right o the injured person. Rolls moothly on large ball-bearing asters. Readily managed by one person.

## 2 Compact

Requires very little floor space when not in use. Opens up to provide large working area. Professionally designed for efficient first-aid.

## 3 Practical

Distributes all first-aid necessities thruout the premises—ready for instant-emergency treatment.

## 4 Complete

Carefully built to accommodate essential medical accessories. A place for instruments, bandages, dressings, etc. A self-contained first-aid equipment station always available where needed.

## 5 Sanitary

The patented Jiffy dustproof cover maintains utmost cleanliness.

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1 CONTAINER for 12 Adhesive Plaster or various sizes of Surgical Tape

4 4 x 4 GLASS DRESSING JARS with Covers

5 4 oz. SOLUTION BOTTLES with Ground Glass Stoppers

4 2 oz. SOLUTION BOTTLES with Ground Glass Stoppers

2 COVER LOCKS (front and back)

1 INSTRUMENT DRAWER

3 SUPPLY DRAWERS

1 2-DOOR STORAGE COMPARTMENT

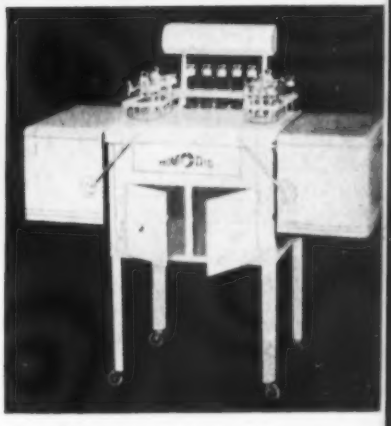
*Overall Dimensions* (with cover closed)
20 wide, 17 deep, 42 high

WORKING SURFACE (with cover open)
42 wide, 17 deep, 31 high

SHIPPING WEIGHT
Approximately 135 lbs

U. S. Patent No. 132532

**SENIOR MODEL**—Price $75—f.o.b. Chicago includes equipment as above specified.



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**JUNIOR MODEL** illustrated above with cover open, is equipped with all the essential utility features of the SENIOR model, including instrument drawer and storage compartment. No cover locks or supply drawers. Overall dimensions same as SENIOR model. Recommended for quantity installations, where extreme economy is desired. Shipping Weight 95 lbs. Price $59.50—f.o.b. Chicago.

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LESSENS THE MAN HOUR LOSS CAUSED BY
CONTACT DERMATITES

In these strenuous times, when industrial production is of utmost importance, man-hour loss must be held to the minimum. Although industrial dermatoses cannot be entirely prevented, earlier return to work can usually be effected with the aid of Calmitol. This dependable antipruritic quickly stops itching, affording relief for hours from a single application. Thus scratching is eliminated and the danger of secondary infection and spread of the original process are obviated. In consequence, resolution is hastened and enforced absenteeism is reduced. Calmitol is also promptly effective in eczema, food and drug rashes, ringworm, urticaria, pruritus scroti, in fact whenever itching must be stopped.

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Calmitol contains chlor-iodo-camphoric aldehyde, levo-hyoscine oleinate, and menthol, incorporated in an alcohol-chloroform-ether vehicle. Pruritus is controlled through its blocking action upon cutaneous receptor organs and nerve endings. Calmitol is protective, bacteriostatic, and induces mild active hyperemia which aids in disposal of toxins.

CALMITOL THE DEPENDABLE ANTI-PRURITIC

crimination or of abuse. There is an urgent need for the development of a unified national wartime health policy with full participation and cooperation of labor, management, the medical profession and the government. Production depends on materials and machines, but above all on men. The health and strength of these men is the key to their productivity. This is the nation's major war problem.

—*The Railway Conductor*, September, 1942, quoting *The American Federationist*.

PROGRESS in improving the nutrition of the industrial worker will depend on several factors. The ability of the worker to buy the proper food depends on his wages and the cost of proper food. Education in dietary matters is fully as important. The worker must know that he cannot work well on a breakfast of doughnuts and coffee. Industry can do much to educate employees by means of pamphlets, serving substantial meals and the employment of a dietitian in large industrial plants. As a concrete example of the proper daily consumption of a worker, the Food and Nutrition Board of the National Research Council, gives the following: at least one pink of milk; two servings of potato; two servings of fruit, one of which should be a citrus variety or tomato; two vegetables; one egg; one serving of meat, fish or poultry; a cereal dish (whole grain); whole grain or enriched white bread at every meal; butter or fortified oleomargarine, the remaining calories to be supplied by a choice of vitamin-rich foods. The study of nutrition of the industrial worker and the population in general is receiving great impetus as a result of the war. Its permanent effect on the health of our people should prove one of the few good results of World War II.

—From an Editorial, "Malnutrition in Industrial Workers," in *Minnesota Medicine*, September, 1942.

DR. LEVERETT D. BRISTOL, Health Director, American Tel. & Tel., and chairman of the Committee on Education of the A. M. A. Council on Industrial Health, in an article in *J. A. M. A.*, August 1, 1942, says: "Depending somewhat on the length of time available and on local conditions and facilities, the content of a postgraduate course, continuation study or institute in industrial health should cover (1) employee relations, (2) management relations, (3) medical relations and (4) public health relations. The first two involve the demand or need for industrial health services, the last two the supply of such services. Among the specific subjects which should be included are (a) common industrial dermatitis and other industrial diseases of local bearing or interest, (b) control of tuberculosis, syphilis and other non-occupational diseases among industrial workers, (c) emergency care of major and minor industrial injuries, (d) the industrial hygiene survey with demonstrations of methods and apparatus, (e) medicolegal aspects of industrial health, and (f) industrial health and the general practitioner, including methods and procedures regarding administration and physical examinations.

### Occupational Deafness

ADEQUATE intervals of rest between periods of exposure to intense industrial noises may prevent or delay onset of permanent cochlear damage, believes DR. DOUGLAS CHAMBERLAIN, of Chattanooga, Tennessee, as a result of audiograms of a group of boilermakers. Power of recovery from aural fatigue may be remarkable but it does not always take place within 15 hours of rest from noise. High tones are usually affected more than low tones, but if there is a permanent high tone loss before exposure to noise, the lower tones may be the only ones for which there is significant fatigue.

—*Mod. Med.*, September, 1942.

### Disabling Sickness

MONTHLY LABOR REVIEW, August, 1942, thus summarizes its analysis of disabling sickness among industrial workers: "An increase in the disability rate for sickness and non-industrial injuries among more than 200,000 male members of industrial sick-benefit associations, group-insurance plans, and company-relief departments was reported in 1941 in a continuing study of the disability experience of these organizations. The rate—101.8 cases per 1,000—was the highest recorded in the 10-year period, 1932-1941. The corresponding rate for 1940 was 96.7. During the fourth quarter of

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# PROTECT THEM WITH AO GOGGLES

For most jobs in the process industry, AO Duralite Chemical Goggles are especially recommended. Super Armorplate Lenses provide resistance to flying chips. Solid baffle-plates in back of the side shields protect the eyes against splashing chemicals. Slots in the lens rings and radial slots in the eye cups and side shields insure ample ventilation to keep eyes cool and prevent the inside of the lens from lens fogging. Above all, these goggles are light in weight, snug-fitting, and unusually comfortable to wear.

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1941 there was a 35% increase in bronchitis as compared with the same quarter in 1940, a 20% increase in diseases of the stomach, except cancer, and about a 15% increase in appendicitis. The rates for these three causes were the highest recorded for this quarter during the past 10 years.

### Zinc Dermatitis

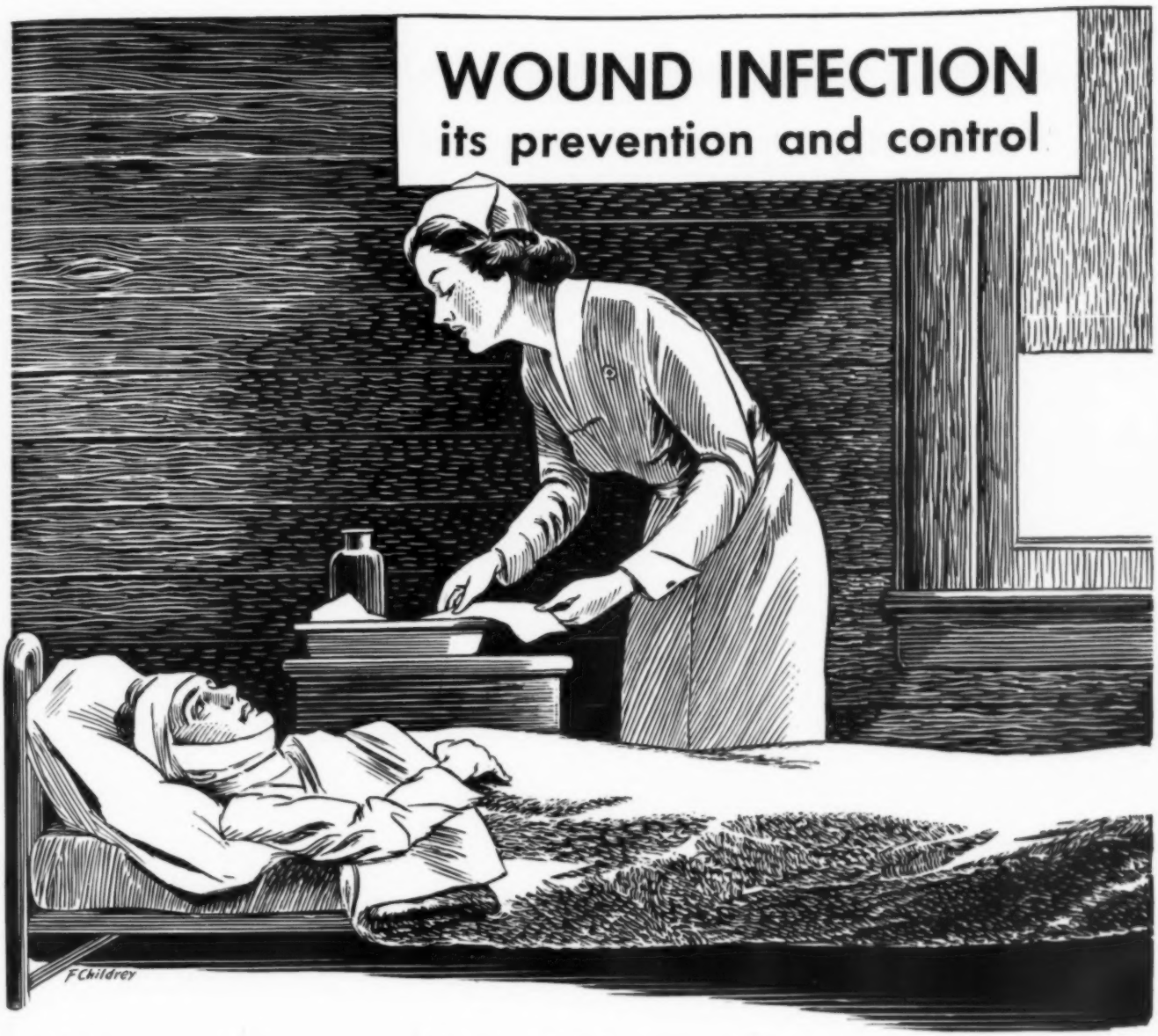
INDUSTRIAL HYGIENE DIGEST, published monthly by Industrial Hygiene Foundation, Pittsburgh, summarizes an article on "Zinc Dermatitis—An Additional Hazard in the Aircraft Industry" by H. E. FREEMAN in *J. A. M. A.*, July 25, 1942: Sensitivity to zinc may be regarded as very rare. It has been suggested that the case of dermatitis reported in this article may have been due to the formation of zinc chloride from zinc reacting with perspiration. This cannot be disproved as, of course, perspiration would occur under a patch test, but it is true that similar scrapings of kirksite have been applied as patch tests on several other persons without inducing any reaction. Zinc chloride is a primary irritant, and these negative results in other persons would indicate that there was a true zinc sensitivity in this case and that the reaction was not due to zinc chloride. A flare-up at previously involved sites when a zinc patch test was applied emphasizes the truly allergic nature of the reaction. This phenomenon has been previously described as the recurrent patch test reaction.

### Emergency Services

THE Office of Civilian Defense has notified its regional medical officers that General Somervell, commanding the army services of supply, has ordered all plants owned by the War Department, as well as civilian plants engaged in production of war material, to plan with local chiefs of the Civilian Defense Emergency Medical Service for the use of available emergency medical facilities. General Somervell also ordered plant protection inspectors to make sure such plans have been formulated. The Office of Civilian Defense has also announced that the Navy is sending out with its official approval OCD recommendations regarding coordinated plans by industrial plants to use the protection facilities of the Emergency Medical Service in the same manner. The OCD memorandum also outlined plans for all factories. Industrial plants are expected to provide medical services and first aid equipment within the plant, but, in event of enemy action, plant physicians, nurses and first aid detachments may be unable to care for all the seriously injured. "It is considered essential, therefore," the OCD said, "that protection of personnel in the plant be coordinated with the local Emergency Medical Service, so that plant facilities may be supplemented by those of the OCD organizations in case of need."

### Hillsdale Survey

THE Bureau of Industrial Hygiene, Michigan Department of Health, has been conducting a study of the industrial plants in Hillsdale county. This county is considered to be typical of the Michigan counties which are not predominantly industrial but which are experiencing an upsurge of industry devoted to war needs. Employment in Hillsdale has increased over 60% during the last year to an estimated 2,300 plus, and a 25% gain in number of industries has been recorded during the last three years. This survey conducted during the summer is believed to be the first on a county-wide scale in the United States. The objectives of the industrial hygiene program are the controlling of environmental influences which affect the physical and mental health of the worker, and the placing of workers at tasks for which they are physically equipped, the maintaining of their physical and mental fitness after they are on their jobs, and the reducing of the amount of productive time and wages lost because of sickness or accident, whether due to occupational or non-occupational causes. Recent survey studies show that work days lost because of accident and occupational hazards in the factories and those resulting during the time spent outside of the factory




# in Post-Operative Wounds

Surgery often involves the control of infection. For instance, loss of tissue in an abdominal wound may predispose to the occurrence of a ventral hernia. An incision for nephrectomy, hydronephrosis or pyonephrosis is practically always a potentially infected wound. Infection following operation on an extremity may, by the production of scar tissue, result in contractures and consequent loss of function. In these instances and many others, infection must be controlled as rapidly as possible.

Reporting several series of cases in a paper "The Treatment of Surgical Infections with New Chlorine Solutions" (Surg. Gyn. & Obst., Vol. 63, pp. 318-324) the author concludes: "The series treated with Azochloramid showed an appreciable reduction in the time of healing with a corresponding decrease in the length of hospitalization."

Many reports in the clinical literature testify to similar successes of Azochloramid in controlling infection.

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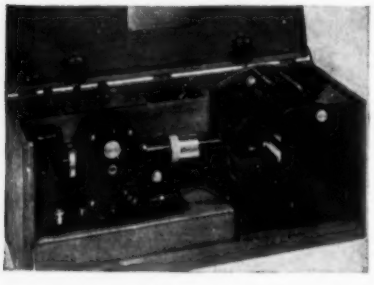
Today, thousands of new workers are entering the factories. America's fate rests upon their output. On the physician in industry is thrust the vital task of keeping these producers fit and "on-the-job." Long hours at the machine, no less than the nerve-racking days at the desk, may overburden the heart . . . result in disrupted production . . . loss of priceless time . . . even cause tragic accidents.



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*Pioneer Manufacturers of the Electrocardiograph*

**CAMBRIDGE**
*all-electric*
**ELECTROCARDIOGRAPH**

make up the whole hazard of the employee. The ill health, accidents and loss of time caused workers during the hours spent outside of the factory are eight times greater than those caused while working.

### Safety Standards

THE Handbook of Industrial Safety Standards, universally accepted for many years as "the safety man's bible," has been revised by the National Conservation Bureau, accident prevention division of the Association of Casualty and Surety Executives, to provide the latest safety developments and protective methods against sabotage and possible air raids for American war plants. A 32-page supplement on wartime protection of industrial plants, including details of setting up and maintaining an organization to protect the plant and its employees against sabotage and air raids, has been added. The Handbook has the approval of the U. S. Department of Labor and is recommended by the U. S. Office of Education as supplemental reading in the Engineering, Science, and Management Defense Training Courses.

### Causes of Absence

AVAILABLE data on the number of absences and the number of days absent based on a three-year experience of a public utility make it possible to examine the causes of absence. While the annual number of absences per 1,000 males is almost 1,000 the corresponding rate for the females is almost 2,000; the annual number of days of disability per person, on the other hand, is about eight days for males and almost 12 for females. The respiratory group of diseases is responsible for over half of the absences and over one-third of the days absent. In the respiratory group colds exact the largest toll of absences and about 10% of the total number of days absent. Of outstanding importance in the digestive group of diseases are diseases of the stomach except cancer, and in the non-respiratory-non-digestive group the rheumatic group of diseases is noteworthy as a time-loser.

—From "Sickness Among Industrial Workers," by DR. WILLIAM M. GAFAFER, in *Connecticut Industry*, August, 1942.

### New Publication

DR. ROLAND H. CROSS, Director, Illinois State Department of Health, submits Volume 1, Number 1, of *What's New in Industrial Hygiene—Engineering, Medical, Nursing*, the September, 1942, number of a new periodical inaugurated by the Division of Industrial Hygiene of the Illinois State Department of Health. The publication is dedicated to the many industrial hygiene workers — physicians, nurses, engineers, public health workers, safety engineers, personnel directors, nutritionists, etc.—upon whose efforts the public health programs that help to "Keep 'Em Working" will largely depend. DR. CROSS says: "Industrial hygiene is a science which has no single source of information. Constant reading of many periodicals and texts, observation of and conversation with others in this work, contact with research agencies, and personal experience in the field, are some of the many avenues by which a broad professional knowledge of the subject is achieved. So wide a realm of experience, and so thorough a background, could not practicably have been gained by each individual industrial hygiene worker. But by assembling periodically selected recommendations and findings of a variety of experienced authorities, much valuable information may be made available for the use of more and more persons interested in the preservation of health in industry."

### Health Rules for Defense Workers

THE Industrial Health and Safety Commission of the State of Illinois has announced, through its Secretary, WILLIAM JOHN GRANATA, the appointment by CHAIRMAN ALFRED J. BORAH of an outstanding group of labor and industrial leaders who will act as an advisory committee to the commission under the provisions of the Health and Safety Act, in establishing new rules for the safeguarding of the health and safety of war workers. Heading the committee as co-chairmen will be VICTOR A. OLANDER, Secretary and Treasurer of the Illinois Federation

# MORE RAPID EPITHELIZATION MEANS

W. R. 60 years. Admitted 11/14/39. Tar burn of left hand, very deep 3rd degree on extensor surface with exposure of extensor tendon of middle finger. Deep 2nd degree of flexor surface of fingers. Treatment: Foille.

**TIMELY INDUSTRIAL CONSIDERATIONS:**

Four years' experience with Foille in industrial and private practices has confirmed that this water-in-oil emulsion

- Provides quicker emergency aid
- Alleviates pain to marked degree
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- Materially lessens contractures
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The above illustrations demonstrate the outstanding value of Foille . . . Particularly well adapted to treatment of burns of hands, face and extremities.

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**LESSENED HOSPITAL STAY**
**QUICKER RETURN TO ACTIVE DUTY**

This marked clinical advantage constitutes the reason why so many major institutions in the power and light, steel and petroleum industries are now specifying the routine use of

## FOILLE *in* BURNS

No skin grafting. Course good, particularly considering location and severity of burn. Finally healed 2/17/40, with little loss of mobility. Can almost clench fist.

Write for literature and clinical sample of Foille.

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of Labor, and O. E. MOUNT, Secretary and Assistant Treasurer of the American Steel Foundries. The Chicago members of the committee are J. L. EARLYWINE, attorney for the Carnegie-Illinois Steel Corp.; DR. J. H. CHIVERS, Medical Director, Crane Co.; HARVEY G. HENSEL, safety director of Youngstown Sheet & Tube Co.; J. W. FREELS, Attorney for the Illinois Central Railroad; CARL F. COFFELT, personnel director of Victor Chemical Co.; and JACOB BENNEMA, president of the School Engineers Union. Other committee members from outside the Chicago area are PAUL BRAND, safety director of Pullman-Standard Works; R. G. SODERSTROM, president of the Illinois Federation of Labor, Springfield; RAY EDMONDSON, president of the Illinois United Mine Workers, Springfield; H. B. BUSHNELL, vice-president, Western Austin Co., Aurora; J. B. HAYES, retired executive of the Owens-Illinois Glass Co., Alton; and GEORGE B. HAZEN, secretary, The Brass Foundry Co., Peoria. Acting as executive secretary for the entire committee will be CHARLES B. CANNON, safety engineer of the Illinois Industrial Commission. The twin objectives of the program are to increase the number of man-hours available for war production and to keep industrial accidents from cutting into the supply of skilled war workers.

Pain, tension and irritation retard essential work in these busy times.

When a sprain or other painful condition interrupts a patient's ability to work, the problem is to get him back on the job in the shortest possible time.

A valuable aid toward this effort is the use of a Burdick Zoalite Infra-Red Lamp. By relieving pain, relaxing spasm and tension, and increasing the local blood supply, the Zoalite encourages prompt restoration of useful activity.

The Burdick Zoalite Infra-Red Lamp

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## Toll

ANNOUNCEMENT by the War Department a few days ago that this nation's casualties in the first six months of war were 4,801 dead, 3,218 wounded and 36,124 missing struck a severe blow to those who have regarded the present conflict as something to be taken without a great deal of concern. In DeKalb county homes where the toll has already reached, the grief that a missing message brings has to be magnified nearly 45,000 times before it can be realized what this conflict means. Yet as heavy as this loss has been it remains but a small thing beside the penalty that is exacted each day in industrial accidents in this nation. While the armed forces were reporting casualties of 44,143, American workers in the same period of time were giving 30,000 lives and 2,500,000 wounded in the production front. The National Safety Council is responsible for collecting these figures, which are almost unbelievable. Just double this toll of accidents that the laboring front has incurred in the last six months and the total accident demand for the nation, from all causes, is the result: deaths, 60,000; injured, 5,500,000 all in a half-year period.

—*De Kalb (Illinois) Chronicle*, July 28, 1942.

## Silica-Free Dust

TUBERCULOSIS as a direct result of occupation is almost entirely concerned with the factor of dust inhalation. As such it has been studied for a great many years, yet the problem is so complex and has so many variables that it is foolhardy to be categorical or dogmatic about it. Certain facts are reasonably well established and give a working basis for further investigation. It seems reasonably certain, for example, that dusts which do not contain substantial amounts of free silica, noxious gases, and poisonous metals do not in themselves tend to increase the incidence of tuberculosis among the workers exposed to them. No matter how uncomfortable the working conditions may be, regardless of what other side effects such dusty atmospheres may have, certainly they do not appear to have any bearing on the development or reactivation of a tuberculous infection. It is a common experience to hear the question raised as to the effect of dust in cement plants, flour mills, sawmills, and many other industries of a similar nature. It is well to know that there is no good evidence to indicate that permanent effects result from such occupational dusts. The degree of fibrosis in the lungs is minimal, and the incidence of tuberculosis is no greater among such workers than in the rest of the population.

—From "Silicosis and Tuberculosis," by LEO G. RIGLER, M.D., on "Industrial Health" page, *Minnesota Medicine*, September, 1942.

# Notes on Dermatitis

In one year, 20,000 cases of industrial dermatitis occur in the U. S. A. with sufficient severity to lose time from work. Actually there are many times this number not losing time from work that are not reported. The actual loss of time is represented by sufficient man-hours to build large quantities of armaments.

• • • • • • • • • •

No. 1 preventive is frequent washing—with a bland soap (such as Lan-O-Kleen), which not only cleans effectively, but also contains lanolin, an oil similar to that secreted by the glands of the skin.

• • • • • • • • • •

Harsh skin cleaners have frequently been found to be the cause of dermatitis, rather than the materials being handled or manufactured. This is especially true of materials hard to remove from the skin.

• • • • • • • • • •

The Indiana Bureau of Industrial Hygiene recently has observed 178 cases of dermatitis due to chlorinated naphthalenes and chlorinated diphenyls. The dermatitis was caused by handling electric wires having "flame proof" coverings composed of a synthetic wax. In one plant where 168 cases were observed, the offending material was shown to contain chlorinated napthalene primarily. There is a wide demand for "flame proof" coverings, especially in some of the war plants, and suggestions are offered by the Bureau that "one should be on the lookout for these materials, especially when one sees dermatitis of face and hands due to handling electric wire."

• • • • • • • • • •

Dr. Louis Schwartz of the U. S. Public Health Service writes, "Most of the cases of industrial dermatitis develop on new employees and are usually mild in character. Such workers should be given a *protective ointment to put over the exposed parts*, proper protective clothing such as rubber gloves, aprons, etc., and kept on the job."

• • • • • • • • • •

Where direct exposure to irritants is unavoidable, the many West Protective Creams have usually proven an effective safe-guard. The West Laboratories are constantly working out new formulae to meet specific cases where special protective creams must be used. The 9 basic creams now manufactured by West, however, are effective for most industrial purposes.

• • • • • • • • • •

Fifteen states now have laws which compensate in varying degrees for occupational dermatoses and also gather statistics concerning the occurrence of these diseases.

*Top Production demands it!*

LAN-O-KLEEN* washing improves work efficiency. A hand cleanser, altogether UNIQUE in that its corn-meal base is impregnated with skin-emollient LANOLIN. It not only is an efficient (though gentle) cleanser but "WORK-CONDITIONS" the hands it cleans. No parching or tendency to chap. The lanolin content coats the hands with this natural oil, helping maintain a naturally moist, healthy skin condition.

LAN-O-KLEEN helps prevent dermatitis, thus it improves work-efficiency and cuts down on lost-time accidents. That is its PLUS VALUE. That is the reason its use is growing so fast in war-busy plants. Nothing must handicap production, NOW.

For those in direct contact with Dermatitis-causative irritants, West manufactures a complete range of SKIN PROTECTIVE CREAMS after formulae especially created to meet certain conditions. Our home and branch office staffs will be glad to discuss your needs for a standard or custom-made product of this kind.

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# AMNIOTIN

The new economy size vials of Amniotin offer two distinct advantages. They provide a substantial saving over the cost of Amniotin in ampuls and they facilitate dosage adjustments to meet the wide variation in requirements of women with menopausal symptoms.

The effectiveness of Amniotin in relieving the distressing vasomotor symptoms of the menopause has been amply demonstrated by numerous clinical reports published during the past 12 years. The product has likewise proved valuable in treating other conditions due to estrogen deficiency.

In the new economy vials of Amniotin there has been no sacrifice of activity, uniformity or stability.

Remember, Amniotin differs from estrogenic substances containing or derived from a single crystalline factor. Amniotin is a highly purified, non-crystalline preparation of naturally occurring estrogenic substances derived from pregnant mares' urine. In addition to the economy vial packages and the ampuls (both of which are for intramuscular injection) you can secure Amniotin in capsules for oral administration and in pessaries for intravaginal use.

## ECONOMY SIZE VIALS

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| 10 cc. . . . . | 10,000 I. U. per cc. |
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This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

The Journal of Industrial Health, Occupational Diseases and Traumatic Surgery
With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery."

The Science, the Law and the Economics of Industrial Health

Volume 11 | October, 1942 | Number 10

# Industrial Dermatitis

*—In Our War Industries—*

LOUIS SCHWARTZ, *Medical Director,*
*U. S. Public Health Service*

THE rapid expansion of our industrial program which involves the conversion of peacetime factories into ordnance and munitions plants and the employment of large numbers of people in hazardous occupations before modern safety appliances can be installed and before new, unskilled workers can be educated to cope with the health hazards of their new jobs, must in the ordinary course of events result in increased industrial diseases.

The skin, being the portion of the body which comes in contact with external irritants, is the first to be affected by many of these industrial poisons. In fact, most of the occupational diseases encountered in our new war industries are dermatoses.

The demands made on the Section of Dermatoses Investigations for the investigation of outbreaks of dermatitis occurring in our war industries have markedly increased the work of this Office.

Since the war program went into effect less than one year ago, we have made surveys of skin hazards in 30 government arsenals and armories employing about 50,000 workers, and in 14 private airplane factories employing about 200,000 workers. We are now engaged in studying the skin hazards and the outbreaks of dermatitis in the privately operated, government-financed ordnance and munitions factories.

This paper reports results of our experiences in all of these plants.

While almost every manufacturing plant in this country can be directly or indirectly connected with our war effort, in this paper we wish to speak only of the skin hazards encountered in the manufacture of actual materials for combat, namely, airplanes, tanks, guns, small arms, munitions, and war gases.

## Cutting Oils

CUTTING oils are the most frequent causes of dermatitis among our factories engaged in the production of war materials. They are used in the making and machining of metal parts. Therefore, they are used in the manufacture of airplanes, tanks, trucks, guns, small arms, projectors, and in the manufacture of almost everything connected with the war.

Cutting oils are divided into two large groups, the soluble and the insoluble.

From the Dermatoses Investigations Section, Division of Industrial Hygiene, National Institute of Health.

The soluble cutting oils in general consist of a sulfonated mineral oil, soap, resin, sulfonic acids, and materials used as mutual solvents to stabilize and preserve the mixture of oil and soap. Preservatives are also used when there are animal or vegetable fats present in the oils. These preservatives may be phenol, nitrobenzene, or cresol. The soluble cutting oils are usually mixed with water in varying proportions and allowed to flow continuously over the cutting operation. Their function is chiefly that of cooling the cutting tools, lubrication being a secondary function.

The insoluble cutting oils consist principally of mineral oil, to which are added various percentages of animal and vegetable oils, sulfur, and chlorine. The fatty oils may be oleic acid, lard oil, fish oils or any of the vegetable oils. The fatty oils act as sulfur carriers, and also increase the lubricating properties of the mineral oil. The sulfur and the chlorine content enable deeper cuts to be made in the metal without harming the cutting tool. The insoluble cutting oils containing animal or vegetable oils usually have added to them chemicals known as inhibitors, the function of which is to prevent the oils from becoming rancid. The inhibitors must be of a type that will not rust iron. They often consist of phenolic compounds of the type of phenolic amines.

## Action of Cutting Oils on the Skin

PETROLEUM oils have the property of defatting the skin. The presence of animal or vegetable oils in petroleum oils tends to lessen their skin defatting properties but, since cutting oils contain only a small percentage of fatty oils, their action does not altogether counteract the defatting action of the mineral oil content.

2. All oils may plug up pores of the skin and form comedones.

3. The sulfur content of the cutting oil may cause a dermatitis because of the actual effect of the sulfur on the skin, or because the sulfur may be converted into hydrogen sulfide or sulfur dioxide by the heat generated in the cutting operation. These two chemicals are both skin irritants.

4. The chlorine content of a cutting oil may be sufficiently high to irritate the skin.

5. Rancid animal or vegetable oils may irritate or sensitize the skin of some workers.

6. Phenols, cresols, nitrobenzenes, and other inhibitors are usually not present in sufficient amounts to be primary irritants, but they may act as sensitizers and cause allergic eczemas. Especially is this true if the custom prevails of adding additional disinfectants to rancid cutting oils with the idea of disinfecting them.

7. Cutting oils, after being used, contain steel slivers which may wound the skin of the workers, especially if old dirty towels and used waste containing slivers are employed for drying the hands.

The type of skin that the worker has influences its susceptibility to dermatitis from cutting oils. A skin having active sebaceous glands is less apt to be defatted than is a dry skin, but is more apt to develop comedones and boils. A smooth, hairless skin is less apt to develop comedones than a hairy one but is more likely to be defatted.

### Types of Dermatitis from Cutting Oils

COMEDONES of the hands and fingers occur in nearly all workers handling cutting oils unless they are particularly careful about washing their hands after work.

2. Folliculitis occurs generally on the extensor surface of the forearms and thighs where oil-soaked machinery or oil-soaked sleeves and trousers are in frequent contact with the skin. The bacteria found in the lesions (folliculitis and boils) are the usual pathogenic staphylococci which are found on the intact skin. It is true that workers sometimes expectorate into cutting oils, and that the oils may even be contaminated with the colon bacillus. However, we believe that it is the bacteria found on the skin and not the bacteria which may be in oil, that are the principal causes of folliculitis and boils. We have cultured and examined many samples of unsterilized, insoluble cutting oils that have caused folliculitis and boils and have found no significant number of staphylococci or streptococci. The insoluble cutting oils are not suitable media for the growth of bacteria because they contain such a large percentage of petroleum oil and because many of them also contain an inhibitor which has antiseptic properties. We, and others, have found non-pathogenic organisms growing in cutting oils, but these do not cause dermatitis. The soluble cutting oils, if they have a high content of fatty oils and water, may be suitable media for the growth of staphylococci or streptococci. However, these organisms, as I stated before, are ordinarily present on the skin, and we have come to the conclusion that the addition of disinfectants to cutting oils will not materially affect the incidence of cutting oil boils and may increase the incidence of cutting oil eczemas.

3. Cutting oils also have a defatting or drying action on the skin, causing it to crack and fissure. Open fissures are subject to secondary infection, resulting in boils, lymphangitis, and even septicemia. Dry skins and skins of older workers are more likely to become cracked and fissured from cutting oils.

4. Metal slivers in the oils and in the waste used for drying the hands often become imbedded in the skin and sometimes are the sites of secondary infections.

5. Some of the mineral oils have keratogenic properties and cause the appearance of papillomas and warts. We have found that about 10% of the workers in mineral oils and greases have such growths. They are usually not troublesome, the workers often not being aware of their presence.

6. Certain oils are carcinogenic, but fortunately the mineral oils of North America are low in the carcinogenic scale. Nevertheless, some cases of skin cancer occur in the United States from mineral oils. Such cancers are usually the prickle cell type. They are usually multiple and do not as a rule have early metastases.

7. Allergic eczemas are the least frequent types of cutting oil dermatitis. They are caused by hypersensitivity to the oils, the inhibitor, or the disinfectant in the oil. We have seen cutting oil that contained as high as 5% of a phenolic disinfectant, which had been added to it from time to time while it was in the machine, to destroy the rancid odor which it developed. In such allergic cases, a patch test with the cutting oil should give a positive reaction.

### Prevention of Dermatitis from Cutting Oils

PREVENTION of dermatitis from cutting oils consists chiefly in cleanliness of the person, of the clothes, of the machines, and of the oil. Workers should be provided with adequate washing facilities and their use should be compulsory.

Clean work clothes should be provided daily to those exposed to large quantities of cutting oils. Sleeves and aprons made of impervious materials, such as some of the new synthetic resins, will help to keep the work clothes clean and, if they are worn, it may be necessary to provide clean work clothes only every other day or even twice a week.

Toilet or liquid soaps should be provided for the workers and placed in convenient locations in the washrooms. Workers having a dermatitis or dry skin should not use soap; they should use as a cleanser a neutral sulfonated castor oil, to which is added a wetting agent such as a fatty alcohol sulfate. We have found that such a cleanser will often clear up a case of cutting oil dermatitis.

The use of kerosene, gasoline, strong bleaches, scouring soaps, and other fat solvents should be prohibited.

The machines themselves should be frequently cleaned. The oil should be changed at least once a week and either discarded or, if it is to be re-used, it should be screened to remove metal and dirt, heat sterilized to remove bacteria, and neutralized to remove rancidity.

Clean towels should be given to the workers every day, or they should have free access to clean waste. Waste should be discarded and not laundered, while towels should be laundered so that all slivers are removed.

Protective ointments, if used, should be of the type which fills the pores of the skin with an innocuous vegetable or animal fat to prevent the entrance of the mineral oil. Such an ointment will also act as a buffer to the fat solvent action of the cutting oil on the skin. A small percentage of a wetting or emulsifying agent such as the fatty alcohol sulfates, added to the protective ointment will make it easily removable from the skin with water. A small percentage of a harmless preservative may be added to the protective ointment to prevent rancidity.

Protective ointments of the "invisible glove" type are not as good against cutting oils as the type described, because resin films, insoluble in oil and which protect against oil, are soluble in water, and the perspiration which forms beneath them washes them off.

Protective ointments which form films soluble in oil, are not desirable because the cutting oil washes them off. The soluble cutting oils will wash away both types of these films. Moreover, the "invisible glove" type of protective ointment cracks when the joints are flexed and leaves areas of the skin unprotected.

### Rust Preventive Compounds

THESE compounds are used when shipping machinery from place to place, for the preservation of metal parts, and when storing large and small arms. Automobile and airplane engines, when shipped from the manufacturers to places where they are to be installed, are sprayed with a rust preventive compound consisting essentially of a petroleum oil and an inhibitor similar to the inhibitors used in cutting oils. Dermatitis occurs not only among the workers spraying this rust preventive on the machines, but also on the workers handling the machines or motors when they are being installed. The dermatitis takes the same forms as that described in cutting oils, namely, folliculitis, boils, and allergic eczematoid dermatitis.

Solvents, usually petroleum distillates such as kerosene and gasoline, are used by the workers to remove the rust preservatives from the machinery. Solvents defat the skin and also cause eczematoid dermatitis.

Vaseline or cosmolin is used when storing guns and small arms in order to prevent rust entering the bores. Solvents are used to remove this rust preventive, and we found that the usual method was to dip a cloth into gasoline to dissolve the grease and to clean out the bores. Dermatitis is quite prevalent from the solvent coming in contact with the skin.

The prevention of dermatitis from applying rust preventives to machinery consists of wearing protective clothing—impervious gloves, sleeves, and aprons. The face may be protected by the application of a protective ointment consisting essentially of a mixture of 70 parts of lanolin and 30 parts of castor oil, to be applied before going to work, washed off at lunchtime, applied again after lunch, and removed with soap and water before going home. The addition of from 1% to 2% of a wetting agent to this ointment makes it more easily removable with ordinary soap and water.

When grease is to be removed from large pieces of ordnance, a steam room with concave floors, having a drain at the lowest point, is probably the best method. The heat dissolves the grease, which is drained off. Any small amount of grease remaining on the metal can be removed by hand.

Small pieces of metal can be degreased by the use of properly constructed degreasing tanks containing trichlorethylene.

Wherever it is necessary to use cloths with solvents to remove grease, the workers should wear impervious sleeves, aprons, and gloves. Ordinary rubber is not suitable for this purpose because solvents rapidly soften and dissolve it. Therefore the synthetic rubbers —such as neoprene, and insoluble resins like the polyvinyl alcohols, are the materials from which sleeves, gloves, and aprons should be made to protect the skin of workers at degreasing operations.

### Electroplating

ELECTROPLATING is a part of most airplane and ordnance factories. Chromium and cadmium are the principal materials used for plating in these industries. In addition there are a number of rust-proofing processes known by such names as parkerizing, chromodizing, anodizing, etc. In all of these processes, the tanks contain irritant fluids and the fumes of irritant chemicals are given off. Nosebleed resulting from ulceration of the nasal septum is fairly common among workers in these operations. Dermatitis is not uncommon from fumes coming from the alkaline plating baths or from baths containing chromic acid and chromates.

Dermatitis also occurs in those workers who clean the parts with strong acids and alkalis before they are immersed in the plating baths. Dermatitis occurs also among the workers who handle the wet metal as it comes from the plating baths. Operators at the plating processes should be protected with long rubber gauntlets and rubber aprons and sleeves. They should also have inserted in their nostrils, two or three times a day, an innocuous grease like vaseline, or lanolin, to protect the nasal septum from irritating fumes. Metal cleaners should wear rubber gauntlets.

### Solvents

THE volatile solvents are extensively used in the manufacture of airplanes and ordnance. In airplane manufacture, the solvents principally used are "dopes" used in spraying the wings and control parts of airplanes, the petroleum distillates, turpentine, and other thinners used in paints. These substances are defatters of the skin and will cause dermatitis on any skin if allowed to remain on it for a sufficient length of time. They also have the sensitizing properties, and certain workers will become sensitized to their action so that they will develop dermatitis from exposure to such small amounts as would not affect the ordinary individual. To prevent dermatitis from thinners, solvents, and "dopes," they should be used under proper exhausts so that the fumes are drawn away from the worker. In addition to this, the workers should wear protective clothing in the form of impervious gloves, sleeves, and aprons, to give protection from splashes. A sensitized worker should use a protective ointment of the type described under "Cutting Oils" and "Rust Preventive Compounds."

Degreasing tanks usually contain trichlorethylene. These tanks should be constructed so that the fumes of trichlorethylene cannot escape. This is effected by having the level of the trichlorethylene two feet or more below the upper level of the tank, and by having cooling coils a foot or more above the level of the liquid and a foot or more below the level of the top of the tank. The covers of degreasing tanks should be kept closed and the workers should wear gloves, sleeves, and aprons impervious to the degreasing fluid.

### Welding

WELDERS and solderers are exposed to the fumes coming off from their work. In the welding of stainless steel and of aluminum alloys, fluoride fluxes are necessary. When the heat is applied, fumes of fluorides and hydrofluoric acid are evolved. If the fumes are not properly removed, the exposed workers may develop nasal mucitis and dermatitis. The removal of fumes can be effected by suction vents.

In soldering, zinc chloride and hydrochloric acid are used, and the fumes are irritants to the skin and mucous membranes. Persons working with fluoride fluxes and at soldering should be protected by using a protective ointment on their faces and suitable protection on their hands, in the form of gloves that will not interfere with their work.

### Explosives

THE principal skin hazards which were observed in the manufacture of explosives were caused by tetryl, TNT, and amatol (a mixture of TNT and ammonium nitrate). Other explosives which cause dermatitis but are not manufactured in such large quantities are fulminate of mercury, lead azide, and lead styphnate. There are other explosives that cause dermatitis which may be used in the future, but which have not been encountered so far in our large munitions plants: hexanitrodiphenylamine and pentaerythrotrol tetranitrate. These explosives are not

primary skin irritants—they cause dermatitis by sensitization.

So far in our experiences among explosives, tetryl is the chief cause of dermatitis. It affects new workers from one to two weeks after they begin handling it. Ten to 15% of all new workers are affected. The dry, powdered tetryl causes a larger percentage of dermatitis than do the pellets or the wet tetryl. Tetryl dermatitis usually begins on the face because the tetryl-soiled fingers are unconsciously applied to it. However, there are operations where tetryl dust occurs in considerable quantities, as in the rooms where the wet tetryl is dried or in the rooms where powdered tetryl is placed into bags to be used as boosters. Here the face and other exposed portions of the skin are directly affected. Points of friction, such as the collar line and the wrists, are favorite sites for dermatitis. The face often becomes so severely affected that the eyelids are closed and the lips are swollen. Nosebleed is fairly common among workers exposed to tetryl dust. Examinations of the nasal mucosa failed to reveal any ulceration but did show considerable congestion. The hands and faces of workers coming in contact with tetryl are often discolored to a yellowish-brown color, similar to that imparted by picric acid. The hair of many of the workers is dyed a reddish-yellow color.

Tetryl should be handled under suction vent hoods. Whenever it is possible for the workers to wear gloves, they should do so. Gloves made of washable, thin chamois are advocated. They should be long enough so that sleeves may be fastened over the wrist to prevent the entrance of dust. The seams should be smooth to prevent irritation of the skin and rubbing in of the tetryl. A protective ointment consisting of vaseline or lanolin should be inserted into the nostrils two or three times a day. Protective ointment should be applied to the face and neck. We have found that an ointment consisting essentially of a water-soluble resin, with which are mixed zinc oxide and iron oxide, is an efficient protective. A protective ointment with an addition of a small amount of tragacanth, devised by the U. S. Public Health Service for the prevention of ivy poisoning, has been found by one of the large government arsenals to be an efficient protective against tetryl dermatitis. It will be recalled that this protective ointment consisted essentially of a 10% sodium perborate in a vanishing cream base.

### TNT

SOME of the workers manufacturing TNT, as well as those filling shells with it, develop dermatitis a week or two after they begin handling the explosive. TNT usually first attacks the hands, wrists, and forearms. The face is not often affected, except in those places where the hands may have rubbed some of the TNT into the skin of the face or where friction from clothes may have rubbed it in. TNT dermatitis on the hands sometimes resembles the deep-seated sago-like vesicles of a fungus infection or phytid. Patch tests with TNT will determine the causative agent. Workers filling shells with the TNT sometimes handle ammonium nitrate, a constituent of amatol, and may develop a dermatitis from the ammonium nitrate rather than from the TNT. Patch tests with both the TNT and the ammonium nitrate will determine the actual cause. Dermatitis from TNT and amatol in shell loading plants is more prevalent where the TNT is melted and poured into the shell than in any other part of the operation.

Workers handling TNT and amatol should be provided with impervious sleeves, aprons, and gloves. The gloves should be of the kind described for those handling tetryl, namely, washable, soft leather with flat seams. Workers handling any explosive should have daily changes of work clothes and should take compulsory supervised showers after work.

Dermatitis occurs among workers with fulminate of mercury, especially when it is being loaded into fuses and primers, and the same protective measures should be applied to workers with fulminate as described for tetryl.

We have seen cases of dermatitis from hexanitrodiphenylamine, an explosive still in the experimental stage. We have not seen any dermatitis from lead azide.

### Chemical Warfare

TEAR gas, or chloracetophenone, is used principally as a training gas to accustom soldiers to the proper use of gas masks. In peace time it is used by the police to disperse crowds. The workers engaged in the manufacture of chloracetophenone are affected with lacrimation and nose and throat irritation for the first hour or so of their shift, after which they seem to become accustomed to the irritant vapors. Cases of dermatitis are quite frequent among these workers. Dermatitis from chloracetophenone usually occurs on the arms and legs. Therefore, impervious sleeves fastened at the wrist, and impervious leggings fastened at the ankles, are recommended as a preventive. Neoprene gloves should also be worn, and clean work clothes should be supplied to the workers daily. Compulsory, supervised shower baths should be provided for workers manufacturing tear gas.

Mustard gas, dichlorethyl sulfide, was the principal vesicant gas used during the last war. It is a transparent amber oily liquid, boiling at 217°C and yielding a vapor 5.5 times heavier than air. In strong concentrations, the odor resembles that of horse-radish or mustard, but under ordinary field conditions it is odorless. Its low volatility makes it persistent for long periods of time in areas over which it has been sprayed. Concentrations as low as 1 to 1,000,000 will cause severe conjunctivitis. Dichlorethyl sulfide is slightly soluble in water but freely soluble in organic solvents. It rapidly penetrates the skin and is supposed to be hydrolyzed by the moisture of the living cell to form hydrochloric acid and dihydroxyethyl sulphide, thus destroying the cell. Injuries by mustard heal very slowly.

The effects of mustard are not apparent until four to six hours after exposure and latent periods up to 24 hours may occur depending on the concentration of the gas. The higher the concentration, the shorter the latent period. Because of the difficulty of detecting mustard gas in the field by the sense of smell, and because of its insidious action on the skin, it is an effective war gas.

In order to prevent mustard from freezing at low temperatures, (pure mustard gas freezes at 14°C) 10 to 25% of a volatile solvent such as carbon tetrachloride, chlorbenzene, nitrobenzene, or chlorpicrin, is added to it. Dichlorethyl sulphide is manufactured by totally enclosed methods. In spite of this fact, a large percentage of the workers suffer from minor mustard burns. All workers manufacturing mustard should be protected by impervious clothing or by clothing manufactured to neutralize mustard. Rubber, leather, and other ordinarily impervious materials are penetrated by mustard. For this reason, clothing impregnated with a chemical that will neutralize mustard is used to protect the workers against the mustard gas. Chemicals suggested and used for this purpose have been those which chlorinate or oxidize mustard gas. They

are the type of calcium chloride, Dakin's solution, the peroxides such as lead and zinc, and the per salts such as the perborates, permanganates, etc.

There are materials made of the synthetic resins which will resist the penetration of mustard for a considerable length of time. Such are rubber chloride, known by the trade name of Pliofilm; vinyl chloride, known by the trade name of Koroseal; the copolymer of vinyl chloride and vinyl acetate, known by the trade name of Vinylite; the polyvinyl alcohols and regenerated cellulose known as cellophane. It is practical to have gloves, sleeves, aprons, and suits made of these materials in order to protect workers and even the general population from mustard gas. Protective ointments against the action of mustard gas have not been very successful. Work is now being conducted along the lines of preparing such an ointment.

### Lewisite

LEWISITE, or chlorvinyldichlorarsine, was developed by Dr. W. L. Lewis in 1917, too late to be used in the World War. It was the result of trying to develop a highly toxic, non-persistent, quick-acting vesicant. Lewisite is an oily light amber liquid, boiling below 200°C and yielding a vapor 7.1 times heavier than air, with a faint odor resembling geraniums. It is soluble in the organic solvents. Like mustard gas, it is decomposed by alkalis and by active oxidants such as chloride of lime and the hypochlorites. It also penetrates clothing, leather, rubber, and the tissues of the body. Like mustard, it is a cell poison and undergoes hydrolysis within the cell, releasing hydrochloric acid and beta chlorvinylarsine oxide. Lewisite quickly penetrates the skin with a slight burning sensation and produces erythema within 30 minutes. Vesicles appear at the end of about 13 hours. The vesicles may all merge, forming one large, bulging vesicle surrounded by an area of hyperemia merging with the healthy skin. Mustard blisters appear only about 24 hours after the exposure.

Dermatitis occurs among workers manufacturing Lewisite, and the same precautions, in the form of protective clothing, should be used by workers against Lewisite as advocated against mustard.

All workers engaged in the manufacture of the vesicant war gases should be furnished with fresh clean protective clothing daily, including protection of the feet and face, as well as the respiratory tract. They should be compelled to take supervised shower baths after work.

### Industrial Cleansers

A CONSIDERABLE portion of the dermatitis occurring in our defense industries is caused by irritant chemicals used for cleaning the skin. Workers, eager to go home early, will often use strong solvents such as carbon tetrachloride, trichlorethylene, kerosene, gasoline, etc., to quickly remove dirt and grease from the skin. These substances, of course, are primary skin irritants and are often the causes of dermatitis wrongly attributed to the materials which the workers handle in the course of their work.

The practice of using strong alkaline soaps containing gritty substitutes for the quick removal of dirt is also a frequent cause of dermatitis. The requirements of a normal industrial cleanser are:

1. It should be freely soluble in hard, soft, hot, or cold water.
2. It should remove fats, oils, and other soil without harming the skin.
3. It should not extract from the skin its natural fats and oils.
4. It should not contain harsh abrasives or irritant scrubbers, which not only may injure the skin, but may also clog the plumbing.
5. It should be handy to use in cake form, or should flow easily through soap dispensers if it is in grained or powdered form.
6. It should not deteriorate or become insect-infested.

In order to meet these requirements, a normal industrial cleanser for general use should consist of a superfatted, neutral toilet soap containing a wetting agent or synthetic detergent, and a soft scrubber which softens or dissolves in water and does not clog the plumbing. It should contain a minimum of free alkali and have a pH of 10 or less in a 1% solution. It should contain no silica, quartz, feldspar, pumice, resin films, or organic solvents.

There are occupations in which the workers handle dyes, pitch, coal tar, and other materials which are hard to remove from the skin. In such occupations, if the workers will not or cannot wear gloves, it is necessary to use stronger cleansing agents than the one described. Whenever this is done, the strong cleanser itself should be washed off with soap and water. After the hands are dry, an emollient such as cold cream or a mixture of 70% lanolin and 30% castor oil should be rubbed into the skin.

For those workers who have dry, cracked, or inflamed skins, we have devised a special cleanser that is the equal of soap and yet does not have the deleterious effect upon inflamed skin which soap has. The cleanser consists of a neutral sulfonated castor oil, to which is added a wetting agent.[1]

### Protective Clothing for the Prevention of Dermatitis

PROTECTIVE clothing[2] is of great value in the prevention of occupational dermatitis. Clothing serves the purpose of keeping the irritant away from the skin. In order for it to do so, it must be impervious to the irritant. Rubber, in the form of gloves, aprons, and boots, was first used for this purpose. Workers often object to the use of rubber for gloves, boots, and aprons because it so closely confines the areas of the skin covered that it does not permit the perspiration to evaporate. Rubber is ill adapted to protect workers from dermatitis who are exposed to petroleum distillates and organic solvents, because these substances attack, penetrate, and dissolve the rubber.

In recent years, synthetic resin films have been developed which are resistant to the action of organic solvents and which are more or less transparent, light in weight, and better adapted for protective clothing than is rubber. Pliofilm, Koroseal, and Vinylite are the trade names of some of these resin films from which suitable protective clothing can be made. The polyvinyl alcohols, which are insoluble in almost all the solvents except water, are already being made into gloves to protect the hands of workers handling the organic solvents. Ordinary cellophane of proper thickness will also protect against most solvents, acids, and alkalis, but is softened by water. We have been trying to interest the manufacturers in making protective clothing from these resins, especially since rubber, both natural and synthetic, is on the priority list.

### Protective Ointments

PROTECTIVE ointments are low on the list of preventive measures but, in many instances, they are the only available means of protection. For instance, the face cannot be covered by protective clothing, and some types of work are so fine that they must be carried on with bare hands. Then again, when pro-

tective ointments are used, the workers invariably remove them with soap and water after work. This removes, at the same time, whatever irritants are on the skin, and adds considerably to the protection supposedly given by the ointment. Moreover, workers like to use protective ointments and derive a sense of security from their use.

Protective ointments should have the following properties:

1. They should be non-irritating and non-sensitizing.
2. They should offer actual protection from the irritant.
3. They should be of such consistency that they can be applied easily.
4. They should be easily removable from the skin after work and yet adhere sufficiently to remain on the skin while the worker is exposed to the irritant.

We have divided protective ointments into six classes, as follows:

1. A simple vanishing cream which when rubbed into the skin fills the pores with soap and thus facilitates the removal of soil when washing after work.
2. Ointments which leave a thin film of a resin or wax on the skin and thus act as mechanical protectives. This class can be subdivided into (a) water-soluble films, and (b) water-insoluble films.
3. Protective ointments which cover the skin and fill the pores with a harmless fat which repels water soluble irritants and prevents the entrance into the pores of harmful petroleum oils, greases, and coal-tar derivatives. Such protective ointments also protect the skin from fat solvents because the fat solvent may expend its force on the protective ointment before it can attack the skin. In order to facilitate the removal of these fatty protectives from the skin, they should have incorporated into them a synthetic wetting agent.
4. Protective ointments which contain a non-irritant chemical for the purpose of detoxifying the industrial irritant have, for instance, a cream containing an innocuous alkali such as magnesium hydroxide or soap, to protect against acids; or a cream containing boric or benzoic acid, to protect against an alkali.
5. Protective ointments which cause inert powders to adhere to the skin, forming a protective covering against skin irritants. Such a protective ointment may consist of a water-soluble or an alcohol-soluble resin containing zinc oxide, calamine, iron oxide, kieselguhr, stearic acid, zinc stearate, etc.
6. Protective ointments consisting of any of the above five formulas, but having added to them a physical light screen such as menthyl salicylate, sesculin, quinine oleate, tannic acid, etc., for the purpose of protecting against excessive sunlight and photosensitizing materials.

### Treatment

THE treatment of an uncomplicated acute dermatitis is simple. Protect the worker from the irritant by any of the means described previously, and treat the acute inflammation. Moist, vesicular types of eruptions are best treated by the application of soothing, astringent-wet dressings such as calamine lotion, Burow's solution, boric acid solution, etc., until the acute inflammation subsides. Then mild ointments, such as boric acid ointment, calamine ointment, zinc oxide ointment, etc., can be used.

We have found it better to allow patients with mild cases of acute occupational dermatitis to remain on the job under treatment for a period of a week or two, rather than to remove them. If they get well under these conditions, they usually become hardened (as the workers call it) and are able to continue work without any further trouble. If they do not recover or become worse, they should be removed from the job and treated until they do get well. We have found that some of these can also be returned to work without developing any further trouble. Those workers who have recurrent attacks of dermatitis while working should be removed from that particular operation and placed somewhere where they do not come in contact with the irritant to which they are sensitive.

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## Minor and Medium Burns

*—Treatment with Sulfathiazole—*

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THE purpose of treatment in any accident in industry is to return the worker to his job in the shortest possible time without undue risk. This should hold true in burns.

Principles of treatment have become well established and may be briefly stated as follows:

1. To prevent or treat shock, whether primary or secondary.
2. To clean up a dirty contaminated wound.
3. To treat that wound so that:
   (a) The patient is comfortable.
   (b) The wound is protected from bacterial invasion and infection.
   (c) The dressing will not injure the already damaged cells.
   (d) The plasma leakage from the raw area will cease and the leakage into the surrounding tissues be reduced.
   (e) The covering can be removed without damage for treatment or inspection.
4. To obtain quick healing with minimum loss of time and function.

A treatment, to be successful, must be measured by these requirements.

As shock, primary or secondary, can occur with relatively minor burns, its cause and treatment will be briefly considered. It is generally conceded that primary shock is caused by fright, pain, etc., and that morphine in ¼ to ½ grain doses will cure this condition.[1]

Nearly all recent observers agree that secondary shock is due to the plasma loss into the tissues about the burn, and, to some extent, to its loss from the burn surface.[5, 9, 11]

We feel that there is an increase of exudate in infected burns and that this, plus infection, contributes to this condition. Treatment is immediate and sufficient administration of plasma.[8]

What part, if any, the absorption of so-called burn toxins plays in burn toxemias has not yet been demonstrated, but it has been shown that treatment, noticeably by tannic acid, has been a large factor in some cases.[10]

Surgical principles hold in burns as in all other wounds. Mason[6] states a burn is essentially a large open wound. The burned area should be cleaned up under warm water, clothing cut away, and the wound

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carefully washed. Blisters should be opened and all shreds of skin gently peeled off with forceps. With sufficient morphine no general anesthesia is necessary.[2] Operating room technique should be approximated when possible.[2, 4]

There are many treatments of burns; each one has its adherents. There is the tannic acid treatment, of Davidson;[3] the genetian violet, and later, the triple dye treatment, of Aldrich;[1] the use of 3% sulfadiazine in 8% triethanolamine, of Pickrell;[7] the Allen and Koch treatment;[1] the treatment of electric burns, by Wells;[10] and others.

Previous to last July, for several months I had been trying to find a treatment that would measure up to the requirements stated in this paper and still allow the worker to stay on the job. Tan would soften in oil and soda solution, so would the eschar formed by gentian violet or triple dye. Ointments containing butesin picrate, cod liver oil, etc., did not stop excessive serous drainage and infection. We had 5% sulfathiazole ointment made up for us that helped infection some, but did not check excessive secretion.

Beginning a year ago, in February, 1941, we had been dusting all our wounds, abrasions, and re-dressings with sulfathiazole powder. By July we had around 40,000 instances of its use, which varied from a simple dusting to a two-ounce jar poured into very extensive lacerations of a badly mangled arm with no bad results. I had checked its comparative lack of absorption into the blood stream when used in considerable quantity in wounds.

Also in June we had a number of large friction burns on the hips and thighs of some of our ball players. We had previously noted how quickly dusting with sulfathiazole controlled oozing in a wound and we found it did the same to a large area denuded of skin, and that, with the addition of a simple boric acid ointment dressing, these wounds healed in record time. They were clean, there was no serous discharge, no redness about the wound, and no sign of infection.

In July we were fortunate to obtain from Dr. Ralph Tovell, of the Hartford Hospital, a supply of intracaine ointment for clinical trial as a surface anesthesia. This ointment proved very successful in relieving pain when used on raw surfaces, and in stopping itching and burning. The relief experienced was prompt and lasting. It seemed logical to combine the dusting of sulfathiazole and the application of this ointment for a treatment of burns. We cleaned burns in the approved fashion, dusted them with sulfathiazole powder, applied the ointment and covered with a gauze dressing. If on the leg or arm, following our treatment for all wounds on these parts we applied an elastic weave bandage and sent the man back to his work. We dressed these burns each day, dusting with sulfathiazole at each dressing and using the intracaine ointment only for the first two or three dressings. There was no need of it after that.

We tried out different ointments over the powder after stopping the intracaine. These contained butesin picrate, cod liver oil, or the old reliable boric acid. We perhaps liked the butesin picrate best, but its use gave a rash about the burn in a number of cases; the cod liver oil ointment was rather difficult to remove; the boric acid ointment had neither of these objections.

In appraising this treatment we found that the intracaine ointment allayed the pain in less than two minutes by the watch in the majority of cases, and that this effect lasted. We sent a large number of case reports to the Squibb Company to that effect. We also found that the individual could work in oil or soda solution without danger of infection; that this treatment did not injure the tissues; that all surface plasma drainage was almost instantly stopped; that the dressing could be changed, and, if done carefully, there was no damage to the growing epithelium, and that when the burn was on an extremity the elastic bandage prevented swelling. There was no redness about these burns, no yellow scum over them, and healing took place in about half the expected time.

From July 1, 1941, to May 1, 1942, we treated 1,503 burns by this method with two cases having lost time and no cases showing any signs of infection. We had no scars of any consequence. These burns varied in area from second-degree, the size of a 25-cent piece, to second-degree of the dorsum of both hands and entire forearms, to large areas on the back and on the legs. Our third-degree burns were all small. The two lost time cases I wish to report in more detail.

Our first lost time case was on February 22, 1942. Shop No. 57017 at night had a second-degree burn about his right ankle and on the dorsum of his foot, of no great extent. He was hysterical and sent to the Hartford Hospital. The burned area was well tanned before I was notified in the morning. It was March 19 before he returned to work, after having spent 19 days in the hospital, and the area required further dressings by our methods. We had had larger burns in the same location lose no time.

The second case was Shop No. 16058. On April 13, 1942, this man had a second-degree burn of his entire right arm and shoulder, extending across his chest and over his entire left shoulder and upper left arm. He also had a first-degree burn of his face and neck. He was our only case of shock that was primary and cured with ½ grain of morphine. He was back at work May 5, 1942, after having a few days' vacation in New York. There was no scarring.

I should like to report an infection that occurred in May, 1942, and not of this series, to show that it can happen if treatment is neglected. Shop No. 29546, on May 2, 1942, received third-degree burns of the proximal phalanges of the 1st, 2nd, and 3rd fingers of the right hand, palmar surface, and on the dorsum of the proximal phalanx of the right thumb. He lived about 20 miles from the factory and, as the wounds were healing well, he neglected treatment. He came in May 14, 1942, with an extensive lymphangitis and lymphadenitis and was immediately sent to the Hartford Hospital in my care. He left the hospital May 16, 1942, and returned to work May 18, 1942.

The conclusions that may be drawn from this treatment in this series of cases are:

1. It fulfills the requirements for the modern treatment of burns.
2. It enables the individual with small and moderately severe burns to continue work in comfort.
3. Work may be done without danger of infection.
4. Healing is not interfered with and takes place in a shorter period of time than by other methods with no scarring.

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# Industrial Medical Problems

*— Distribution in California —*

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WITHIN the short space of two years, California has been transformed from a primarily agricultural into a highly industrialized state. As late as 1939 agriculture was the chief industry of the state, and such manufacturing as existed consisted largely of processing farm products and petroleum, and producing consumer goods for the surrounding farm districts. Literally overnight, the impact of the war effort has brought about a profound change in California industry and consequently has altered many aspects of the industrial medical problems within the state and has accentuated the importance of others.

In February, 1941, the estimated number of workers in California industries was about 1,000,000 persons. The Chamber of Commerce reports that there are now 2,100,000 civilian workers employed in activities other than agriculture, and that 395,000, or 19%, of these are in manufacturing industries classified as "essential war industries." New workers are being added to war industry at the rate of more than 12,000 a month. This rate of increase is considered too conservative, however, because it is estimated that at least 60,000 new shipyard workers alone will be needed as a result of the award of recent contracts to California shipyards for additional work.

It is of interest to note that the percentage of non-agricultural workers in California in essential war industries is more than double the percentage in the nation at large; whereas in California the percentage of such workers is 19, the percentage in the nation is less than eight.

In February of last year the amount of government contract awards for war materials, since the inception of production of materials for the armed forces, was approximately 400 million dollars. Today, the latest estimates of the Chamber of Commerce indicate total government contract awards for war materials and for construction of military and plant facilities in California are 10 times this amount, or more than four and a half billion dollars. Over 90% of these orders for war materials are for transportation equipment and supplies, including aircraft, ships, motor vehicles, and petroleum products.

Basically, the nature and extent of industrial medical problems within a state are determined by the type of industries and the size of the plants. In other words, a state which has a mining industry but no textile industry will have the occupational disease problems peculiar to the mining industry and will not need to be concerned about the occupational disease problems incurred in textile manufacture. A state which has most of its working population employed in large factories will not need to devote so much attention to the health problems characteristic of small factories. There are, of course, industrial medical problems which occur in every industry regardless of type or size, and these I shall discuss briefly later.

## Distribution According to Type of Industry

THERE are four chief centers of war manufacturing industries in California. These are San Diego, Los Angeles (city and county), San Francisco, and the East Bay area which includes Oakland, Alameda, Berkeley, Richmond, Pittsburg, and Vallejo. The all-important industries which make these areas the center of war activity are, as is well known, the aircraft and the shipbuilding industries. San Diego and Los Angeles are the concentration points of the aircraft industry; and Los Angeles, San Francisco, and the East Bay area are the concentration points for shipbuilding.

Before discussing the specific occupational disease problems of each of these industries, it should be emphasized that there is one special problem which confronts both. That problem is the introduction into these industries of thousands of workers who have never before worked in industry. The State Division of Immigration and Housing has reported that, contrary to popular belief, the so-called dustbowl influx to California, which began in 1935, has steadily increased since 1939. During 1941, some 110,000 automobile migrants (exclusive of those who travel by bus and train) entered the state in search of employment—a sharp increase over 1940 and a still greater increase over 1939. The majority come from the same areas which were the source of the earlier migration, namely, from the agricultural and plains states.

Most of the current migrants are in search of *industrial* employment, and are going directly to the war centers upon their arrival rather than to agricultural districts. Further, many of the earlier migrants already in the state are moving from the agricultural districts to the urban areas. As a result of this absorption into industry of workers unaccustomed to an industrial environment, industrial medical problems are rendered more complicated by the lack of health and safety consciousness on the part of such workers.

Evidence to support this contention is available in industrial accident data, which show that since the inception of war production, in many industrial operations, the accident-frequency rate has been at least double the percentage increase in employment. The employment of new workers unfamiliar with the hazards of plant operations is not the only reason for the increased accident rate, but it is one of the most important contributing factors.

With reference to the specific occupational hazards in the aircraft industry, there are many processes and operations in the manufacture of aircraft which involve the exposure of workers to potentially harmful gases, fumes, dusts, vapors, chemicals, and skin irritants. However, the health hazards found in these processes are the same as those which are encountered in similar types of work in other industries. No process or operation in aircraft manufacture is peculiar to that industry, except possibly the coating of fabric surfaces with a quick-drying paint or "dope," and the puncture-proofing of gasoline tanks.

Thus, the principal health hazards in aircraft manufacture are: lead and zinc oxide dust and fumes in the pouring and shaping of lead and zinc dies, which are used for forming aluminum alloy sheets into required shapes; alkalies, such as sodium hydroxide; and degreasing solvents, such as trichlorethylene, carbon tetrachloride, and paint thinners, used in the cleaning of metal parts; silica dust in sand-blasting operations; oxides of nitrogen, carbon monoxide, and fluoride fumes in welding operations; chromic acid, cadmium, and hydrogen cyanide in the plating of metals; cyanide fumes in the annealing of steel parts; lead fumes in the assembly of control cables and electrical wiring; paint thinners and nitrate dope in spray-painting and doping operations; carbon monoxide from gas burners used in many locations; high temperatures at annealing pots, in the foundry, at heat-treat furnaces, and in other

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areas; and roentgen rays used to detect flaws in cast-steel parts which will be subjected to heavy stresses.

The principal skin hazards are those from cutting oils used on metal-working machinery; thinners and solvents used in paints and "dopes"; chromic acid and dichromates in the rustproofing or anodizing of metals; cadmium and hydrogen cyanide in the electroplating of metals; fluxes used in welding; and solvents used for cleaning and degreasing.

All of these hazards can be controlled by well-established measures whose efficiency has long since been demonstrated.

The shipbuilding industry likewise has no health hazards peculiar to it alone as an industry. This is undoubtedly true because, like the aircraft industry, most shipbuilding establishments constitute an aggregation of smaller industries, that is, they consist of "factories within a factory." Thus, many of the health hazards which are involved in aircraft manufacture are also found in shipbuilding. These hazards include: lead and zinc oxide fumes in the foundry; silica dust at molding and shake-out operations in the foundry and in sand-blasting; organic solvents in the cleaning and degreasing of metals and in painting operations; oxides of nitrogen, carbon monoxide, fluoride fumes, and arc flash in welding operations; chromic acid vapors in electroplating; and radium and roentgen rays used to detect flaws in metal parts. Control measures are also available for such hazards in shipbuilding, but their application is sometimes rendered more difficult when operations such as painting and welding are performed in enclosed spaces on board ship.

The petroleum production industry, which is also an important California industry, is centered in the southern part of the state. Kern, Los Angeles, Orange, Fresno, Santa Barbara, and Ventura counties are all important producers of crude petroleum. In addition, Contra Costa county is an important center of oil refining.

Occupational skin diseases constitute one of the chief causes of lost-time disability in the petroleum production industry. In a study made by the Industrial Hygiene Service, over 700 oil-field workers, who were exposed to intense direct sunlight as well as to crude oil and solvents, were examined for skin lesions. One percent of these workers had skin cancers of the exposed body surfaces. About 20% had keratoses, which occasionally are the forerunners of epitheliomas or skin cancers.

In the oil refining industry, the principal skin hazards are from acids, alkalis, caustics, coke, and petroleum itself.

Dermatitis is the most important occupational disease in what was, until the war production program, the state's main industry, namely the food canning and packing industry. Dermatitis is produced in workers through contact with foods, and is probably on the basis of hypersensitivity in most cases. This industry, which is no less important than in the past although its relative position in the state's economy has changed, is not concentrated within any one section of the state. The four chief centers of war industries (San Diego, Los Angeles, San Francisco, and the East Bay area) are also important centers of fruit, vegetable, and fish canning and packing factories. Other principal centers of this industry are Sacramento, Monterey, Fresno, Santa Clara, San Joaquin, Orange, Riverside, San Bernardino, Sonoma, Stanislaus, and San Mateo counties.

California has a wide variety of other industries, but although the value of their products is not inconsiderable, they are in general on a much smaller scale, more widely scattered, and employ fewer workers, as individual industries, than do the aforementioned ones. The basic lumber industry is concentrated in the far northern counties. Mining, which is an important factor in the state's economic life, however is carried on in approximately three-quarters of the counties. Forty counties produce gold, although the Grass Valley and Nevada City district is the outstanding center of production. Copper production is centered in Trinity county; lead production in Inyo county; tungsten is produced in San Bernardino county; and magnesite in Stanislaus and Santa Clara counties. The quicksilver mines of the state provide a large portion of the world's supply. These mines are scattered throughout several counties. Apparel manufacture is important in Los Angeles, San Francisco, and Napa counties. Machine tool and die factories have become increasingly important in the four major industrial areas.

Discussion of industrial medical problems cannot be limited to a simple recital of the occupational disease hazards which one may expect to encounter in any given industry. It is known that nine-tenths of the annual industrial disability is due to non-occupational sickness and accidents. The importance of this fact has received increasing acknowledgment, as is evidenced by the extension of medical services in many industries to include not merely first-aid treatment and accident control and prevention, but also health promotion as provided by pre-employment and periodic physical examinations; correction of defects, provision for hygienic as well as safe working conditions, health education for all workers on non-industrial as well as industrial diseases and accidents, and sick absenteeism recording for all absences due to sickness, whether industrial or not.

However, as was emphasized at the recent National Conference of Governmental Industrial Hygienists, where industrial hygienists from Federal, state, and local public health agencies attended, approximately two-thirds of the industrial population of the United States works in plants employing 500 workers or less, the majority of which provide no industrial health services of any kind. It was the consensus of this Conference that there is not only a need for the expansion of industrial health services in the larger industries which do not yet have complete programs, but that there is also a critical, even desperate, need for medical and nursing services in small plants.

The problem of providing health services in small plants is one that is not confined to any one area. Wherever there is industry, there are small plants. The individual contribution of these small industries to the nation's present victory program is small. But, together, their total contribution is enormous. The effort to inaugurate medical or nursing services in these plants must be of equal size.

Therefore, although it is impossible to describe California's problem in this respect in terms of geographic distribution, it cannot be dismissed for that reason. The census data available for the state as a whole are not recent enough to be entirely valid today. However, the data for 1939 show that 99% of the plants in California were small plants employing 500 workers or less, and that 81% of the industrial population was employed in plants of this size. In 1939, then, California actually had a greater percentage of its workers (81% as against 66%) employed in small plants than did the United States as a whole, and therefore could have expected a more acute problem with respect to health services for its workers.

It is reasonable to expect that the course of the state's industrial development since 1939 has changed

that picture somewhat, although to what extent it is impossible to tell. It is possible, for example, to surmise that there has been a certain mortality among small industries unable to participate in the war production program. It is fairly easy to see that industries in which larger plants are characteristic—aircraft and shipbuilding—have accounted for the greatest part of the increase in industrial employment. Therefore, we may expect that a larger percentage of the state's industrial population is concentrated in large industries than was heretofore true. However, this does not dispose of the problem of health services for small plants.

To digress a moment, the fact that a larger percentage of the industrial workers is employed in large industries does not necessarily mean that they are adequately provided with health services. Many plants are to be complimented on the excellent health services which they provide their employees. But it is also true that some of the war industries have mushroomed so quickly that it has been literally impossible for their health services to keep pace with the increase in employment. Such plants have the problem of "stepping-up" their industrial health services — medical, engineering, and nursing—at the same time they step up production, and to a degree that preventable diseases and accidents, occupational or non-occupational, shall not exact a disastrous toll in workers' lives and health—and in diminished war production.

But to return to the problem of health services for small plants. The problem demands prompt solution today, particularly since the long-discussed utilization of small plant facilities for the production of the "bits and pieces" of war material which they are capable of turning out is now making rapid progress. The solution is not an easy one, but experience has shown that there are several practical methods of providing such services.

Everyone is familiar with the practice of using "on-call" physicians and, therefore, there is no need for discussion of that procedure, other than to say that, although the scope of this particular procedure is necessarily limited, the alert on-call physician who familiarizes himself with the working environment of patients could do much toward suggesting measures for the control of health hazards in the plant.

Part-time medical and nursing services are the obvious solution for a small plant's health problems. A unit or team system, in which one physician and one or more nurses divide their time among several small plants conveniently located has been one of the most successful methods. Such a method usually allows for a broader program within each industry, and frequently leads to the establishment of full-time nursing services in an individual plant, these services continuing to be supervised by the part-time physician. There can be no set rules as to how much and what kind of work is to be carried out by such a team, because of variations due to type and size of industry, age and sex of workers, adequacy of medical and nursing time available, and existing community resources. However, the goal which such a program would have as its objective should be the same as those for large plants, namely, control and prevention of potential health hazards in the working environment, pre-employment and periodic physical examinations, follow-up for corrections, safety promotion, plant hygiene, and general health education.

I have mentioned the various types of industry which are to be found in the various sections of the state. Many changes have undoubtedly been made in all areas. New industries have been recently established in areas where no industrial plants were in existence only a short time ago. In many places there has undoubtedly been a complete change-over in some plants to production of war products.

I spoke of the problem of maintaining and establishing proper medical and nursing facilities in small plants. The main load of this problem will rest upon the private practitioner or upon the on-call or part-time industrial physician.

In conclusion, then, the individual contribution of each industrial physician in the victory effort appears small, but his own work in handling the problems of the plant to which he is attached can be done best by himself alone because he knows the need there the best and he also knows the hazards to which his workers are exposed. The summation of the effort of all these industrial physicians, however, is decidedly not small and is all-important in keeping the war production program moving.

As Dr. Townsend, Chief of the Division of Industrial Hygiene, National Institute of Health, said, "All-out, day and night production for victory, and healthy safeguarded workers, are as inseparable as two faces on the same coin."

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## Smoke and Fire Gases

*—Toxic Constituents—*

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FIRES in American industrial plants kill about 500 people and injure about 1000 every year in normal times,[1, 1a] but current reports indicate that the toll will be greater this year because of conditions due to our war effort. This is a matter that concerns the industrial physician, for, while fire protection is outside of his province, he must deal with the effects of the hazards created by fire.

Among these hazards, the toxic products of combustion are of special importance. Many fire casualties are caused by flames, heat, falls, and falling objects, but, according to fire protection engineers, a much greater number are due to smoke and fire gases. "In major fire catastrophes it is seldom that any large number of deaths are due to burns. Smoke and heated gases commonly prove fatal, even before the flames reach the victims, and there are many cases of death by fire where there is no evidence of any actual contact with flame or even any great degree of heat.[2]

Cases of the last description indicate that the gases given off by burning materials may be highly toxic. Thus, a fire that broke out in the Hotel Plaza, Jersey City, on December 29, 1937, was confined to the lobby and the dining room on the first floor; yet, persons on the sixth and seventh floors were killed by smoke, which, according to the evidence, seems to have been neither highly heated nor so concentrated as to produce anoxemia.[3]

To the industrial physician, the toxic constituents of fire gases are of interest from the standpoint of the treatment of non-fatal cases of "smoke poisoning," but there is also a medicolegal aspect that is undoubtedly of growing importance.

For example, a group of firemen entered a cold storage vault for furs in order to extinguish a fire originating in an electrically-operated refrigerating unit that kept the interior of the vault cold. They were overcome by fumes and, later, sued the owners of the vault and others for compensation for the injuries thus received.

The point at issue in this case was as follows: Were the firemen injured by the gases generated by burning electrical insulation, which would form a hazard normal to their profession; or were the injuries caused by the decomposition products of the refrigerant used in the cooling unit, which, it was claimed, would represent a special hazard from which firemen should have been safeguarded by those responsible for the installation.

Similar questions arise in industrial compensation cases, and it then becomes desirable to identify the agent that actually caused certain injuries.

RESEARCH on the toxic constituents of the products of combustion was stimulated by the Cleveland Clinic Hospital disaster, of May 15, 1929, when 125 persons were killed, in most cases as the result of inhaling the gases arising from burning nitrocellulose x-ray films.

These gases were studied by Olsen[4] who found in them not only carbon dioxide, carbon monoxide, and pyroligneous acid, but also large volumes of nitrous fumes and small amounts of hydrocyanic acid.

This work, in turn, led Olsen to study the thermal decomposition products of a number of more common combustible materials.[5]

In one series of experiments, Olsen allowed chemically-equivalent weights of wood and of gasoline to burn out in a room having a capacity of 1104 cubic feet and then analyzed the resulting atmosphere. The following results are typical:

GASES PRODUCED BY BURNING

| | 10 lbs. wood (50% consumed) | 1000 cc. gasoline (all consumed) |
|---|---|---|
| Carbon dioxide | 5.7% | 3.0% |
| Carbon monoxide | 2.7% | 0.6% |
| Oxygen | 9.0% | 18.6% |
| Unsat. hydrocarbons | 1.4% | 0.0% |
| Sat. hydrocarbons | 0.4% | 0.0% |
| Acetic acid | 0.24% | 0.0% |
| Nitrogen | Balance | Balance |

Obviously, the wood fire left an atmosphere that was not only more toxic but also more deficient in oxygen than that left by the gasoline fire. This latter finding, Olsen points out, is due to the fact that the charcoal formed in the wood fire continues to glow and consume oxygen after the flames have died out, whereas the soot deposited by burning gasoline does not smolder.

In another series of experiments, paper, rubber, wool, and silk were decomposed thermally in an atmosphere of nitrogen and also burned in an excess of air. These two conditions—the destructive distillation of the material in the absence of oxygen, and complete combustion—represent extreme limits. Both, probably, occur in most fires, so that the gases actually generated will ordinarily consist of mixtures of those found in each type of experiment.

NEWSPAPER

| | Gases Produced When | |
|---|---|---|
| | Decomposed in Atmosphere of N. | Burned in Excess of Air |
| Carbon dioxide | 46.1% | 7.6% |
| Carbon monoxide | 38.1% | 6.2% |
| Hydrogen | 5.4% | 0.0% |
| Oxygen | 0.0% | 7.7% |
| Nitrogen | 0.0% | 77.6% |
| Acetic acid | 1.6% | 0.0% |
| Methane | 7.5% | 0.0% |
| Unsat. hydrocarbons | 1.4% | 1.2% |
| Total gases | | |
| Cc. per gram | 57 | 5000 |
| Cu. ft. per lb. | 0.91 | 80.1 |

RUBBER INSULATION

| | Gases Produced When | |
|---|---|---|
| | Decomposed in Atmosphere of N. | Burned in Excess of Air |
| Carbon dioxide | 20.1% | 13.55% |
| Carbon monoxide | 10.1% | 7.55% |
| Unsat. hydrocarbons | 22.6% | 2.65% |
| Sat. hydrocarbons | 17.9% | 0.45% |
| Methane | 8.4% | 7.40% |
| Hydrogen | 13.4% | 10.00% |
| Hydrogen sulphide | 4.1% | 0.12% |
| Sulphur dioxide | 3.4% | * |
| Oxygen | 0.0% | 6.55% |
| Nitrogen | 0.0% | 51.73% |
| Total gases | | |
| Cc. per gram | 56 | |
| Cu. ft. per lb. | 0.90 | |

*Most of the sulphur probably oxidizes to sulphates, so little is found in the gases.

In the thermal decomposition of both wool and silk, large volumes of ammonia are given off. As this ammonia is mostly absorbed by the condensed water vapor when the gases cool, the compositions of the cool and hot gases vary widely, so both are given.

WOOLEN MATERIAL

| | Gases Produced When | | |
|---|---|---|---|
| | Decomposed in Atmosphere of N. | | Burned in Excess of Air |
| | Cool Gas | Hot Gas | |
| Carbon dioxide | 22.1% | 8.9% | 6.2 % |
| Carbon monoxide | 17.6% | 6.5% | 5.0 % |
| Oxygen | 5.3% | 2.0% | 10.8 % |
| Unsat. hydrocarbons | 2.8% | 1.1% | 0.6 % |
| Sat. hydrocarbons | 4.5% | 1.7% | 0.4 % |
| Hydrogen sulphide | 23.3% | 8.5% | 0.17% |
| Sulphur dioxide | 0.0% | 0.0% | 0.10% |
| Hydrocyanic acid | 2.0% | 6.6% | 2.52% |
| Methane | 9.4% | 3.4% | 0.6 % |
| Ammonia | 1.4% | 56.9% | 1.68% |
| Hydrogen | 1.8% | 0.7% | 0.2 % |
| Nitrogen | 9.8% | 3.7% | 71.73% |
| Total gases | | | |
| Cc. per gram | 19.9 | 38.7 | 2763 |
| Cu. ft. per lb. | 0.32 | 0.62 | 44.2 |

SILK

| | Gases Produced When | | |
|---|---|---|---|
| | Decomposed in Atmosphere of N. | | Burned in Excess of Air |
| Carbon dioxide | 24.0% | 1.7% | 12.6 % |
| Carbon monoxide | 12.5% | 5.0% | 4.4 % |
| Oxygen | 3.1% | 3.0% | 4.6 % |
| Unsat. hydrocarbons | 1.8% | 1.1% | 0.2 % |
| Sat. hydrocarbons | 1.1% | 2.5% | 0.0 % |
| Methane | 9.6% | 0.7% | 0.9 % |
| Hydrogen | 24.9% | 2.2% | 1.9 % |
| Ammonia | 7.9% | 55.0% | 3.19% |
| Hydrocyanic acid | 1.2% | 12.3% | 2.22% |
| Nitrogen | 13.9% | 16.5% | 70.00% |
| Total gases | | | |
| Cc. per gram | 36 | 98.6 | 2300 |
| Cu. ft. per lb. | 0.58 | 1.58 | 36.8 |

It is evident from the foregoing data that considerable amounts of carbon monoxide are generated by burning materials even when there is an excess of air; that irritants of some description are generally formed; and that such gases as hydrocyanic acid, ammonia, hydrogen sulphide, and sulphur dioxide may be produced in toxic concentration by fires involving rubber, silk, wool, and, probably, other complex organic substances.

It follows, therefore, that, while most cases of smoke poisoning are likely to be due primarily to carbon monoxide, complications caused by other toxic factors may have to be considered.

But, in evaluating the effects of fire gases in various concentrations, the standard toxicity tables for individual gases may be misleading, because some evidence indicates that gaseous mixtures may be more toxic than their constituents taken singly.

Thus, Hofer[6] found that mixtures consisting of carbon monoxide, 50 parts per 10,000, and hydrogen sulphide, four parts per 10,000, were uniformly fatal to animals in 10 minutes, although neither gas was fatal when breathed alone. He also obtained similar results with mixtures of carbon monoxide and hydrocyanic acid. Luce, too,[7] noticed, in experiments with mice, that most combinations of vapors in low concentrations showed additive effects.

In addition, the part played by carbon dioxide, which is always present in fire gases, may have to be considered. This gas, by stimulating respiration, may cause abnormal intakes of the other gases, thereby rendering toxic concentrations that would otherwise be harmless.

Fire protection engineers believe that some such explanation is required for the extreme toxicity that appears to be displayed by fire gases under certain circumstances,[2] but sound medical information on this subject seems lacking.

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## Fractures of the Patella

*—Methods of Treatment—*


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FRACTURE of the knee cap has long been recognized as a serious injury. Long periods of convalescence and permanent impairment of function are frequent occurrences. There are several factors which are peculiar to this injury which combine to prejudice the outcome. First, patellar fractures heal slowly even under the best of circumstances. This is explained by the low osteogenic properties of the bone. If the patella reacted to trauma to the same degree that long bones do it would soon become grossly deformed by osteophytic reaction, as a result of the frequent traumas to which it is subjected. This lack of bone forming reaction, then, is one of the properties which peculiarly fits it to act as a protective buffer or shock absorber for the knee joint. Secondly, in severe fractures difficulty is experienced in securing accurate reduction and in maintaining position until bony healing has occurred. The resultant development of non-union or of roughening and irregularity of the articular surfaces of the bone predisposes to chronic arthritic changes. Third, and last, the associated injuries, which are often complicating factors, as well as the joint changes and muscle atrophy developing from long immobilization frequently are the cause of more disability than perhaps the primary injury itself

For purposes of treatment fractures of the patella may be divided into two groups:

1. Simple fractures in which there is no appreciable separation of fragments, which get along well with slight protection.

2. Severe fractures in which there is decided separation of fragments with lateral tearing of the extensor apparatus of the knee, and frequently with severe comminution of a portion of the bone itself.

It is this latter group of fractures which commonly result in prolonged disability.

A review of the literature of the past decade reveals that there is a decided trend towards what is termed as "more radical" treatment of these fractures in an attempt to minimize both the period of temporary and the extent of permanent disability. There seems little question that operative treatment does offer substantial advantages. Three rather definite types of surgical procedure appear to be leading in popularity at the present time. The first and most conservative form of treatment consists of open reduction of the fragments with fixation by the method of choice of the operator until bony healing has occurred. The second and more radical method of treatment is complete excision of the patella with direct suture of the separated tendinous apparatus.

The disadvantages of the first procedure are:

1. Bony healing is slow and often uncertain and the period of disability tends to be long.

2. Accurate reduction and fixation are difficult, particularly in comminuted fractures where in many instances it is actually not possible.

3. Healing in malposition with roughening or disproportion of the articular surfaces usually results in a weak and painful joint.

The advantage of this procedure, when successful, is that it retains the patella, thus conserving its protective and stabilizing functions in relation to the joint. Conversely, the great disadvantage of the second procedure, or complete excision, is that it does away with the patella and thus discards the chief protective mechanism of the joint, leaving this—the largest exposed joint of the body—open to direct trauma. Furthermore, from the standpoint of industrial or compensation cases, the complete removal of so prominent a bone constitutes in itself a substantial damage and potential disability. The great advantage of treatment by complete excision is that it at once reduces the healing problem from one of regeneration of a slowly healing bone to one of simple healing of tendon to tendon; eliminates the possibility of any mechanical irritation from a malformed knee cap and permits the early return to active motion and function with surprisingly little impairment in strength.

The third procedure is one which seeks to combine the advantages of the first two, while eliminating their disadvantages. It consists of the excision, in most instances, of all but one chief fragment of the patella, followed by careful repair of the extensor apparatus; utilizing the remaining bony fragment as a mainstay for the opposing tendinous structures which are sutured to it through drill holes in the bone. Brooke, in supporting the treatment of patellar fractures by complete excision, has demonstrated by experimental work that the action of the knee joint is even somewhat facilitated following removal of the knee cap. However, in reviewing his work we find that his graphs are a record of motion largely from the right angle to a straight knee position, and demonstrated smoothness and celerity of motion rather than the amount of power transmitted through the joint. A study of the knee joint from a static mechanical viewpoint reveals that in flexion of the joint beyond a right angle removal of the patella allows the quadriceps tendon to drop down into the intercondylar groove and shifts

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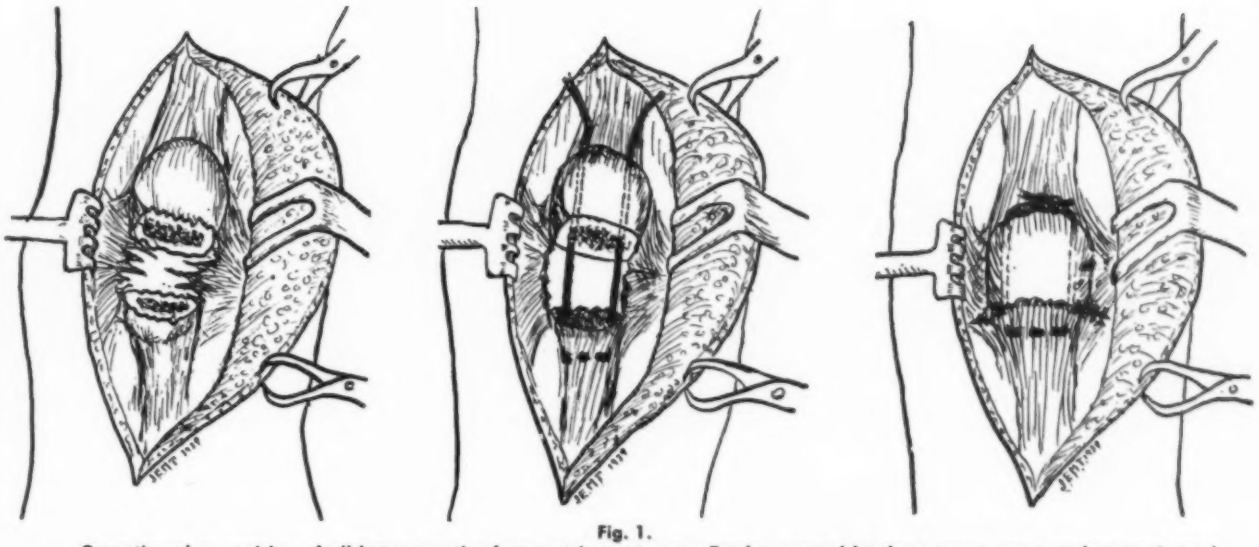

Fig. 1.
Operative plan, excision of all but one major fragment in most cases. Tendon secured by deep strong suture and approximated to patellar fragment by tying suture through drill holes in the bone. A careful repair of lateral capsular tears is essential and re-establishes the integrity of the quadriceps apparatus.

the line of extension force from 24° to 28° backwards, thus lessening its mechanical efficiency by an estimated 12 to 16%.

In 1934 one of us (J.E. M. T.) reported to the Orthopedic Section of the American Medical Association the excellent results obtained by him in the treatment of severely comminuted fractures of the patella by sharp excision of the comminuted portions of the bone, followed by suture of the tendon to the remaining fragment and careful repair of lateral tendinous and capsular tears. Since that time we have reported the continued success of this method of treatment before a number of groups; and, last fall, having received many encouraging reports from surgeons who had used this procedure, we felt that it would be a worthwhile project to make an end result study of cases so treated by surgeons all over the country, in an effort to evaluate better its application to various types of fractures; not alone on the basis of our own experience, but rather by its success or failure in the hands of others.

Many of the leading surgeons working with fractures were canvassed by questionnaire, with the result that 115 responded as having used this method in from one to 39 cases. A total of 554 cases were collected and studied; representing, to the best of our knowledge, one of the largest series reviewed for the evaluation of any single method of treatment of this fracture, and we believe that certain of these findings will be of particular interest to the industrial surgeon. The average age of these patients was 40 years, with 77% of the fractures occurring between the ages of 20 and 60. Approximately 26% of this series were simple fractures, while 61% were simple comminuted fractures and 13% were compound fractures.

Individual factors influenced the time of operation, but it is interesting to note that, of 424 cases operated upon within the first two weeks, 29% were operated upon within 24 hours, 65% within three days and 80% within one week. Cases in which operation was delayed were rather evenly divided among: (1) cases in which conservative treatment had failed, (2) compound injuries not suitable for early closure, and (3) cases of non-union or separation of fragments following previous operations. The period of immobilization averaged 4.17 weeks and varied largely with the severity of the injury and the complications of the individual case. Some surgeons expressed the feeling that immobilization was not of major importance when adequate repair was made.

There was a group of 189 cases in which no complicating injury was reported and in which the average loss of time from work was 8.3 weeks. In another group of 79 cases, with complicating injuries, the period of disability was 14 weeks. Thus in 268 cases there was an average loss from work of 9.9 weeks.

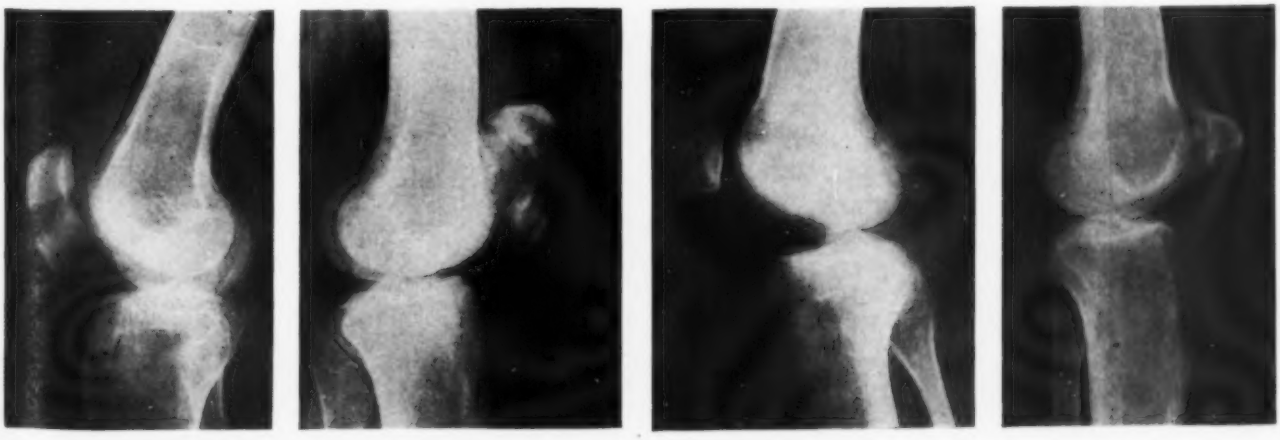

Fig. 2.
(a) This procedure has been found useful in cases where there is separation of fragments. Up to half of the patella has been removed in several instances with no resultant complications. (b) Typical post-operative x-ray appearance.

There were 433 reports estimating the extent of permanent disability, of these 350 reported no disability. Seventy-two reports showed a disability of from 5% to 15%, although in most instances they reported the result as excellent, splendid or satisfactory. Eleven reports showed a disability of from 20 to 50%. Of these 83 cases reporting disability, 61 had complicating injuries and it was in this group that the more severe disabilities were reported.

Four cases had subsequent injuries with refracture of the tendon, but apparently no bony injury. No disability was reported after a second repair. Another case had a refracture of the remaining fragment which was satisfactorily re-operated by the same method. In 15 cases a weakness of the knee in full extension was noted, which was usually associated with a high-riding patella. This, we believe, is due to stretching out of the tendinous structure as a result of improper after-care or insecure approximation of the fragment to the tendon.

Our operative treatment has varied but little from that originally described. However, a number of modifications have been suggested by various surgeons, particularly in the use of wire as a suture material and in variations of the technique of plastic repair. In uncomplicated cases the patient is usually returned to bed with fixation only by a compression bandage and five to seven pounds moleskin traction in extension. After five to eight days the dressings are changed and a snug fitting straight leg cylinder is applied from the ankle to the thigh, supported by incorporated adhesive traction straps. This protection is worn for about three weeks, during which time the patient becomes progressively more active, first with the aid of crutches and later with full weight-bearing. The plaster is then removed and light active motion initiated with the aid of such physiotherapeutic measures as heat, massage and muscle training. The range of motion is at first quite limited, but with functional activity both motion and strength are developed and many patients are able to walk quite normally within five to seven weeks after operation, although full return of functional strength usually requires from nine to 12 weeks. We feel it important to stress the value of functional activity as opposed to passive stretching procedures in the aftercare of this injury.

### Summary

THIS review of a large series of fractured patellas treated by this method of plastic repair by 115 different surgeons justifies, we feel, our recommendation of its use in the treatment of most fractures of the patella with separation of fragments because:

1. The operative technique is not complicated and can readily be carried out by any adequately equipped surgeon.
2. The protective function of the patella is retained.
3. The factors contributing to arthritic changes are minimized.
4. The healing problem is simplified to one of soft tissue repair.
5. The period of healing is shortened and the degree of permanent disability is lessened.

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CURRENT discussions of the continued absenteeism of workers in mines and war industries indicate plans for the issuance of an order which will provide for the immediate drafting into the armed forces of deferred workers for absence from regular work without sufficient excuse.

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# Anthraco-Silicosis

## — *Among Bituminous Coal Miners* —

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WITH increasing interest in silicosis and related diseases in recent years, there has been considerable speculation on the question as to whether or not workers in bituminous coal mines are subjected to significant exposures of disease-producing dusts. Some investigators have maintained that silicotic fibrosis occurs in the lungs of these workers, but others have stated that the preponderance of carbon particles in these mine dusts is relatively harmless, and may even exert a protective influence against tuberculosis, an infectious disease often associated with silicosis in some industries.

Numerous reports by Badham and Taylor,[1] Cooke,[2] Cummins and Sladden,[3] and official reports from Great Britain and Australia have indicated that fibrotic disease of the lungs is recognized as a serious health hazard in many of their collieries.

In this country a survey made by the U. S. Public Health Service[4] in 1933 in the Pennsylvania anthracite mines revealed that anthraco-silicosis occurred in 23% of the 2,711 workers examined, and was proportional to the intensity and duration of dust exposure. In that study anthraco-silicosis was shown to be a modified form of silicosis.

No extensive studies of anthraco-silicosis among bituminous coal miners have been made in this country, although in a limited study of the Public Health Service[5] in 1927 among bituminous coal miners in West Virginia, generalized pulmonary fibrosis indicating early silicotic changes, was found to increase with increasing duration of employment and the hazard was thought to be more severe among rock drillers. Unpublished observations by Russell[6] in 1932 in another section of West Virginia confirmed these findings.

Dr. R. R. Sayers, Director of the Bureau of Mines, has stated: "that coal mining is carried on in more states, provides more freight, furnishes more power, and gives employment to more men than any other branch of the mineral industries or any single manufacturing industry." In view of this fact, and the probable great expansion of soft coal production in connection with the National Defense Program, particular interest is attached to a recent investigation of anthraco-silicosis among soft coal miners, made in Utah during 1939 by the U. S. Public Health Service and the Utah State Board of Health, in which a study was conducted of the health and working environment of employees in three representative bituminous coal mines.[7, 8] Occupational and medical histories, and physical and x-ray examinations were made on 545 coal mine workers, about 80% of the men employed at that time. In addition, clinical laboratory examinations of the blood and urine were performed.

Engineering studies were made to determine the environmental factors which may have a bearing on the health of workers engaged in particular occupations. The nature and concentration of various types of dust found in certain operations were determined. Studies of ventilation and humidity, and the composition of mine gases were carried out. The methods and facilities for the control of health hazards, already in

From the Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service, in cooperation with the Utah State Board of Health. Read before the American Institute of Mining and Metallurgical Engineers, New York City.

use in the Utah coal mines, were investigated, with the view of recommending additional control measures where necessary.[6]

When the occupational histories were analyzed it was discovered that 38 coal mine workers had at some time in the past been employed for more than two years in another dusty trade such as metal mines. These men were eliminated from statistical study because of the probability that their previous experience would affect the results showing the relationship of working conditions in coal mines upon the worker's health. Among these 38 men there were four with second-stage silicosis showing moderate disability, and two with first-stage silicosis showing little or no disability.

As shown in Table I, 16 cases of anthraco-silicosis were found among the 507 mine workers whose only occupational dust exposure had been in bituminous coal mines. These cases were not advanced or seriously disabled. Only one case of moderately advanced (second-stage) anthraco-silicosis was found and no well advanced (third-stage) case was observed. The degrees of pulmonary fibrosis shown by x-ray changes in the lung field markings of these individuals were similar to the markings found among anthracite mine workers who had *early* anthraco-silicosis. The bilateral, massive, conglomerate x-ray shadows, indicating *advanced* silicosis, seen in 3.9% of the anthracite mine workers, were not observed in any of these bituminous coal mine workers.

Diagnosis of anthraco-silicosis was based on three factors as discussed by Sayers[9] in 1939.

1. Characteristic lung-field markings as shown by a satisfactory x-ray film of the chest, which was interpreted independently of other findings by a group of physicians familiar with this disease.

2. Symptoms and physical findings such as shortness of breath, dry cough, prolonged expiration, weakness, abnormal breath sounds, and impaired diaphragmatic movement, which supported the x-ray findings and excluded other diseases as being the cause of these x-ray changes.

3. An occupational history which revealed evidence of prolonged exposures to dust known to contain silica.

It will be observed in Table I that no case of anthraco-silicosis occurred among workers with less than 10 years of employment in bituminous coal mines, regardless of the average dust exposure. Only two cases of anthraco-silicosis were found among persons with a known average weighted dust exposure of less than 20 million particles per cubic foot of air. If persons with a dust exposure greater than this are considered it will be seen that the incidence of anthraco-silicosis increases from 4% for those employed from 10-19 years, to 11% for those employed 20-29 years, to 50% for those employed 30 or more years. Three out of the four bituminous coal mine workers who had been employed more than 30 years in an average dust concentration of 30 million particles and over showed evidence of anthraco-silicosis, and included the only second-stage case found. However, among the 11 coal mine workers who had been employed more than 30 years (including three for more than 40 years) in an average dust concentration of only 10-20 million particles, no case of anthraco-silicosis appeared.

When the occupational history for each of the 16 men classified as having anthraco-silicosis was examined it was noted that the greater part of the working life of each of these men had been spent in underground occupations; indeed, none was considered to have his principal occupation at the surface. These 16 workers represent 4.6% of all those employed underground. Work at the coal face was an important part of the experience of 13 of the affected individuals. All persons showing evidence of anthraco-silicosis had had some experience in one or more of the following occupations: Machine loader, undercutter operator, and coal digger and hand loader. According to principal occupation in bituminous coal mines, six were undercutter operators and helpers, four coal diggers and hand loaders, two shot firers and tampers, two trackmen, one driller and one mule driver. There were many other occupations in which no cases of anthraco-silicosis were found.

Tuberculosis as a complication of silicosis is generally recognized as a most important cause of disability in many dusty trades. Among the 489 coal mine workers for whom satisfactory x-ray films were made there were 13 classified as having adult type pulmonary tuberculosis, of whom three had active lesions, nine had apparently healed lesions, and one had a lesion the activity of which was unknown. Only one tuberculosis lesion, which was minimal and apparently healed, occurred among the 16 anthraco-silicosis cases. The incidence of pulmonary tuberculosis among the entire group of coal mine workers, 2.7%, is about the same as that frequently given for the general adult male population (2%).

The dusts to which underground workers were exposed had their origin in face operations, rock dusting, and the dispersal of traction sand used in the haulageways, while in the tipple the dust was generated in the crushing of coal and bony. To determine the average dust exposure in the various occupations, 168 atmospheric dust samples were collected. Expressed as millions of particles per cubic foot of air, the results were weighted according to the various activities which were performed during a working day. As seen from Table II, occupations near the working face had the greatest dust concentrations underground. Thus, hand loaders had 38 million par-

TABLE I.

NUMBER OF COAL MINE WORKERS WITH ANTHRACO-SILICOSIS ACCORDING TO DUST CONCENTRATION[1] AND NUMBER OF YEARS EMPLOYED IN COAL MINES

| Dust concentration, million particles per cubic foot | | Years employed in coal mines: Less than 10 | 10-19 | 20-29 | 30 and Over | Total |
|---|---|---|---|---|---|---|
| 0–9.9 | Number exposed | 74 | 65 | 28 | 9 | 176 |
| | Number with anthraco-silicosis | 0 | 0 | 0 | 1 | 1 |
| 10.0–19.9 | Number exposed | 73 | 57 | 18 | 11 | 159 |
| | Number with anthraco-silicosis | 0 | 0 | 1 | 0 | 1 |
| 20.0–29.9 | Number exposed | 33 | 28 | 16 | 8 | 85 |
| | Number with anthraco-silicosis | 0 | 1 | 1 | 3 | 5 |
| 30.0 and over | Number exposed | 27 | 23 | 11 | 4 | 65 |
| | Number with anthraco-silicosis | 0 | 1 | 2 | 3 | 6 |
| Exposure not determined | Number exposed | 2 | 6 | 6 | 8 | 22 |
| | Number with anthraco-silicosis | 0 | 1 | 0 | 2 | 3 |

[1]Dust concentrations are weighted according to the activities involved in occupation and the length of time the worker was employed in each specific occupation.

ticles per cubic foot of air, undercutters 34 million particles, rock dusters 30 million particles, drillers 26 million particles, rock workers 23 million particles, and shot firers 12 million particles. Loader operators, conveyor operators, bratticemen, stopping men, and transportation workers were exposed to dust concentrations of less than 10 million particles. Above ground the dustiest occupations were found in the tipple. Box car loaders, with a dust concentration of 119 million particles per cubic foot, exceeded all other occupations. The next greatest concentrations in the tipple were for car dumpers and couplers, rope tenders, and switchmen, who were exposed to approximately 30 million particles per cubic foot of air. The only surface occupation, excluding dummy making and tipple operations, which had a high concentration of dust was sand drying, with 98 million particles and dummy making with 11 million particles. All other surface workers had an exposure of five million particles or less.

Since it appears that a large group of these bituminous coal mine workers had an appreciable dust exposure it is important to examine the composition and size of this dust with respect to possible health hazards. Samples of materials and settled dust which were collected showed silica to be present. Five material samples obtained in the vicinity of face workers had a total silica content from 3% to 68%, while the quartz content of these samples varied from less than 1 to 11%. Traction sand in the haulageways and roof rock had averages of 69% and 51% of quartz, respectively. Workers in these mines are evidently exposed to some free silica (quartz) and to larger quantities of combined silica.

The dust suspended in the air of the bituminous coal mines was of a size that could readily gain access to the lungs. The median size of the dust particles, 1.94 microns, is somewhat larger than that found in anthracite coal mines.

The results of analyses of atmospheric gases indicated that carbon dioxide, oxygen, and nitrogen did not vary greatly from the usual concentrations found in the general outdoor atmosphere. Carbon monoxide occurred only in the samples taken immediately after blasting, and was quickly dissipated. In only one sample did the concentration of the methane exceed the recommended maximum of the Bureau of Mines (less than 0.5%).

Ventilation studies showed that although each mine was supplied with air much in excess of the 150 cubic feet per minute required by the Industrial Commission of Utah, more than half the working faces had air velocities of less than 40 feet per minute and the air movement in some working places was practically zero.

In general, it appears that anthraco-silicosis, a modified form of silicosis due to breathing siliceous dust intermixed with large amounts of carbon dust, was the only occupational disease of significance encountered in the medical and x-ray examination of 507 workers whose experience in dusty trades had been limited to bituminous coal mines. Fifteen of the 16 workers so affected showed evidence of first-stage anthraco-silicosis with but little disability, one worker showed evidence of second-stage anthraco-silicosis with moderate disability, and no workers were found with severe or total disability. All of these men had been employed principally in underground occupations. It is thought that their free silica exposure resulted from work at the coal face which involved the handling of coal containing bony, from rock dusting, and from the dispersion of fine sand in the haulageways.

TABLE II.
SUMMARY OF OCCUPATIONAL DUST EXPOSURE OF WORKERS IN BITUMINOUS COAL MINES

| | Percent of men employed | Number of samples taken[1] | Number of millions of dust particles per cubic foot of air (Weighted average) |
|---|---|---|---|
| UNDERGROUND WORKERS: | | | |
| Face operations— | | | |
| Undercutter operators and helpers | 3.8 | 23 | 33.6 |
| Drillers and helpers | 6.3 | 25 | 26.0 |
| Shot firers and fire bosses | 3.0 | 13 | 12.4 |
| Facemen, loader operators and helpers | 4.5 | 22 | 9.3 |
| Conveyor operators & helpers | 3.1 | 14 | 7.8 |
| Hand loaders and coal diggers | 18.5 | 25 | 38.2 |
| Machine oper'rs, miscellaneous | 1.6 | 9 | 9.0 |
| Development work— | | | |
| Rock workers | .3 | 139[2] | 23.1 |
| Ventilation— | | | |
| Brattice men and sprinklers | .7 | 14 | 5.2 |
| Masons and stopping men | .9 | 11 | 5.1 |
| Rock dusters (hand) | .2 | 23 | 33.6 |
| Transportation— | | | |
| Motormen, car nippers and rope riders | 10.5 | 18 | 9.3 |
| Hoistmen | 1.0 | 6 | 3.8 |
| Mule skinners and drivers | .4 | 9 | 6.7 |
| Tool nippers, material men | .2 | 14 | 5.2 |
| Hoisting water— | | | |
| Pumpmen | .1 | 10 | 4.8 |
| Timbering— | | | |
| Timbermen and helpers | .7 | 4 | 4.2 |
| Maintenance— | | | |
| Trackmen, clean-up men and laborers | 9.3 | 14 | 10.4 |
| Pipemen, mechanics and electricians | 4.5 | 14 | 5.2 |
| Superintendence— | | | |
| Mine foremen and assistant foremen | 1.4 | 25 | 5.1 |
| Face and pillar bosses | 2.0 | 25 | 8.5 |
| Miscellaneous— | | | |
| Dummy makers | .4 | 2 | 11.4 |
| Dispatchers | .2 | 2 | 6.0 |
| SURFACE WORKERS: | | | |
| Transportation— | | | |
| Truck drivers and teamsters | .6 | 9 | 2.8 |
| Maintenance— | | | |
| Maintenance workers | 7.7 | 9 | 2.8 |
| Coal preparation (tipple)— | | | |
| Bony pickers | 6.4 | 11 | 14.7 |
| Weighmen, car droppers and trimmers | 2.8 | 4 | 2.9 |
| Tipple foremen and operators | 2.1 | 4 | 17.0 |
| Car dumpers | .5 | 4 | 29.4 |
| Couplers, rope tenders and switchmen | .5 | 2 | 30.0 |
| Box car loaders | .5 | 3 | 118.9 |
| Oilers | .3 | 1 | 9.5 |
| Clean-up men and laborers | .4 | 11 | 14.7 |
| Superintendence— | | | |
| Superintendents | .3 | 25 | 5.1 |
| Cashiers, clerks, and 'phone operators | 1.3 | 5 | 1.5 |
| Lampmen and fanmen | .7 | 9 | 2.8 |
| Engineers and ass't. engineers | .5 | 25 | 4.2 |
| Miscellaneous— | | | |
| Material men, watchmen and guards | .5 | 5 | 1.5 |
| Janitors | .1 | 9 | 2.8 |
| Sand dryers | .2 | 2 | 98.2 |
| Dummy makers | .2 | 2 | 11.4 |
| Storekeepers and store clerks | .8 | 2 | 1.5 |

[1] In many instances one sample applied to more than one occupation.
[2] Samples for rock workers were obtained in metal mines.

TABLE III.
COMPARISON OF THE DUST EXPOSURE OF BITUMINOUS COAL MINE WORKERS UNDER CONTROLLED AND UNCONTROLLED WORKING CONDITIONS

| Operation | Average dust concentration in millions of particles per cubic foot of air: Controlled | Uncontrolled | Remarks |
|---|---|---|---|
| Undercutting coal | 5 | 56 | Thorough use of water and adequate ventilation at face decrease dust concentration |
| Drilling | 10 | 63 | Wetting of bug dust essential for low dust concentration |
| Machine loading coal | 4 | 18 | Wetting of coal to be loaded reduces dust concentration |
| Hand loading coal | 5 | 123 | Wetting of coal and greater air movement especially in low seam necessary to reduce dust |
| Hauling coal in mine | 4 | 23 | Wetting both coal and empty cars reduces dust in haulageways |
| Preparation of coal | 2 | 34 | Wet process or local exhaust ventilation necessary to reduce dust concentration |

As shown in Table III, engineering control methods which involve the thorough use of water at the point of dust generation and adequate ventilation of working places are very effective in reducing dust concentrations, so that no exposure need exceed 10 million particles per cubic foot of air. For example, the hand loading of coal which produced a dust concentration of 123 million particles per cubic foot of air in one mine when control methods were not used, fell to five million particles at another working face where the coal was wetted and there was good circulation of air. In addition to wetting the filled coal cars, the road bed itself should be sprinkled wherever sand has been used, since such sand contains a high percent of free silica. It will be noted that the dust produced in the preparation of coal can be reduced from 34 million to two million particles by a wet-washing system or local exhaust ventilation. After control methods have been adopted periodic studies of the working environment and the workers' health should be made by trained persons to determine if such methods are really adequate.

As a group these bituminous coal miners appeared to be in good health and there was no evidence of ill-effects of other occupational hazards. Pulmonary tuberculosis (2.7%), syphilis (1.8%), and cardiovascular disorders (8.5%) were found in nearly the same proportion as in other industrial surveys. Miners' nystagmus, bursitis, and related conditions were not observed.

No evidence of lead or other metallic intoxication was found.[10]

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10. Acknowledgments are made to the following persons who took an active part in the study: J. L. JONES and J. WALTER HOUGH performed a large share of the physical examinations. MESSRS. R. W. FRANKS and R. T. PAGE assisted materially with the engineering studies. The medical and engineering studies were made under the direction of DR. R. R. SAYERS and MR. J. J. BLOOMFIELD, respectively.


THE prospects for further development of industrial medicine are very promising. The subject is at long last, and for the time being at least, receiving a measure of attention which is justified. The impetus which has been given to the physical welfare of industrial workers during the past few years has been motivated by the growing conviction that good business and good health are inseparably related, and that industrial poor health is an unnecessary and expensive industrial waste product.

—CRIT PHARRIS, M.D., in "Medical Services in Small Industrial Plants," in *Am. J. Public Health*, August, 1942.

## Industrial Back Disabilities

*— A Survey —*


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PAINFUL back cases are among the most difficult of the problems of industrial medicine because of the complexity of their diagnosis and treatment. These back cases, being so great in number, are one of the chief causes for concern of the industrial physician. Workers in a large industry are always in danger of back sprain and back injuries because of the nature of their work. One difficulty confronting the physician with these cases is the fact that the patient is prone to exaggerate his symptoms. Also the lack of marked and visible lesions, and an indefinite history in many patients, make correct diagnosis most arduous. Consequently such back cases are frequently diagnosed and treated improperly. Because of this possibility, a very thorough history must be taken, a complete physical examination conducted, and an exhaustive study and careful interpretation of roentgenologic films in at least two different planes must be made. The literature concerning disabilities of the back is voluminous, but this paper will concern itself entirely with my own experience with the industrial back. The industrial back, as I have seen it, is usually of an acute nature and is seen shortly following the incidence of trauma.

In a survey of back cases conducted at Westinghouse Electric and Manufacturing Company, East Pittsburgh Works, it was found that most of them were low back sprains of myofascial origin. Direct and indirect trauma was the causative factor in a few of these painful back cases, with foci of infection contributory to some cases of both types. In dealing with these workers, a case record chart was used (Fig. 1) which shows the history, complete physical examination, result of x-ray, simple laboratory tests, length of disability, and treatment. There were 136 consecutive cases studied over a period of six months.

The injured worker will usually report his disability as a result of trauma, and his subjective complaints are usually those of pain and inability to perform certain movements of the back. The records show that the causative factors in our cases could be classified into four groups: (1) those disabilities due to lifting, representing 44%; (2) those caused by the patient being directly struck in the back, representing 10%; (3) those resulting from a fall, representing 17%; and (4) those ascribable to miscellaneous causes, representing 29%. In lifting, the low back sprain seems to develop either because of an extra heavy load, or an unaccustomed load. Yet there were cases of men developing the low back sprain who lifted the same amount day after day without variation. It is interesting to note that lifting accidents were much greater than those of falling and being struck. Under miscellaneous are listed those who develop painful back for a reason peculiar only to the individual, such as developing lame back for no apparent reason, stooping for several hours, twisting, pushing, sweeping, and pulling. The men involved in the survey seemed to have nothing significant in their personal or family histories, except for the usual childhood diseases. How-

[I HEREBY certify that the opinions and assertions contained in this article are my private ones and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

—WILSON DOUGHERTY, Lieutenant (j.g.) MC-V (G) USNR.]

ever, there were many cases, such as bad teeth and chronic tonsilitis, which semed to aggravate the injury and prolong the condition.

A very thorough general physical examination was made of the patient to determine whether any foci of infection might be causal or contributory to the backache. Out of 136 cases, 32% had dental caries which I felt were contributory to prolonging the disabilities. Not all the carious teeth were involved to the same extent, but the percentage of lame back cases with this involvement was high. Chronic tonsilitis appeared in 13% of the cases, and this served in each instance to prolong the lame back.

Local study of the back was made by inspection, palpation, and determination of range of movement. In inspection of the back, posture was noted, as well as paravertebral muscle spasm and deviation of spine, and a manual examination was made to discover temperature, tenderness, and muscle spasm. Palpation of the sciatic, peroneal, and posterior tibial nerves was also conducted to discover tenderness over these sites. Many cases were found of tenderness over the middle of the sacrum. Rectal examinations were done, when involvement of the sacro-iliac was suspected, to note any tenderness or bulging of the anterior surface of the joint. At the same time, the prostate was examined for enlargement. Objective examination of the spine, included any evidence of tender areas, and muscle spasm, and any restriction of the movements of the spine in forward, backward, and lateral range. In the lying position, the patient was examined for hamstring spasm by the straight-leg raising test. Of the cases surveyed, 28% were found to have hamstring spasm. When the sacro-iliac joint was believed to be involved the tests of Kernig, Lasegue, and Gaenslen were applied. In 50% of the cases studied, these tests were used. All of the patients were given neurological examinations which consisted of motor and sensory findings, with special attention to any alteration of reflexes. The patient's lower extremities were examined for equality of length, atrophy, deformities, and condition of feet, and the weight-bearing line was noted.

A certain finesse is necessary in interpreting x-rays of the back in relation to the subjective complaints and objective findings. All the cases in this series were examined roentgoenologically even when no underlying osseous pathology was suspected. True A-P and lateral views were made in each instance. These x-ray pictures are frequently taken in industrial cases to complete the records and safeguard the employer in medicolegal actions. In 96% of the x-rays, the results were reported negative. Among the positive x-ray findings, many showed clouding or haziness about the sacro-iliac joints, and in several films of older patients there was evidence of osteo-arthritis, both of the lumbar and sacral spine, and certain developmental defects of the vertebral column. Many in this group showed x-ray evidence of certain developmental defects in the underlying osseous structure, representing a potential weakness in the back. Abnormalities appeared in 60% of the films which were not the cause of low back pain, but might have been a factor in prolonging the patient's acute disability. These anatomic variations included enlarged and bulbous transverse processes, impinging transverse processes, low-lying fifth lumbar vertebrae, acute angulation between fifth lumbar and sacrum, arthritis of the facets, alterations in direction of facets, spina bifida occulta, sacralization of fifth lumbar vertebrae, lumbarization of first sacral vertebrae, and occasional alteration in the number of lumbar vertebrae, e.g., six instead of five. No fractures were noted.

Sciatic neuritis, secondary to the acute low back was encountered frequently but was found in our cases, to be of short duration. The duration and intensity of this pain depends upon the position of the patient; sitting affecting some cases, lying or standing affecting others, and many being affected by all three. Straight leg raising was more limited than usual and always multiplied the pain.

Urinalyses and blood Wassermanns failed to show anything but negative results in the majority of cases, and I felt that the few positives had no relation to the acute back pain. Except for the discovery of dental sepsis and chronic tonsillar disease, the back findings were the only ones of actual help in diagnosis.

Diagnosis was made by the history, clinical findings, and results of x-ray. Acute physiological back sprains comprised 87% of the cases, the remainder being sacro-iliac sprains, lumbosacral sprains, and acute traumatic back sprains. I believe that the pathology involved in these low back sprains was a generalized myofasciitis of the lumbar muscles with an associated stretching of the ligaments. Along with the sprain occurs a tearing of muscle fibers with resultant hemorrhage and effusion in the muscles, and between the muscle sheaths. These petechial hemorrhages organize and heal with scar tissue. Therefore, absence of treatment would cause a chronic lumbar myofasciitis.

Treatment of the back sprains in the acute stage consisted of application of heat in form of infra-red rays, together with strapping of the affected area with three-inch adhesive tape. Proper strapping of the back is important. When the strapping was removed, the patient received further heat, the back was massaged, and graduated exercises were employed. The patients were advised to use a flat and firm bed at home with a small pillow supporting the lumbar spine. To allay the

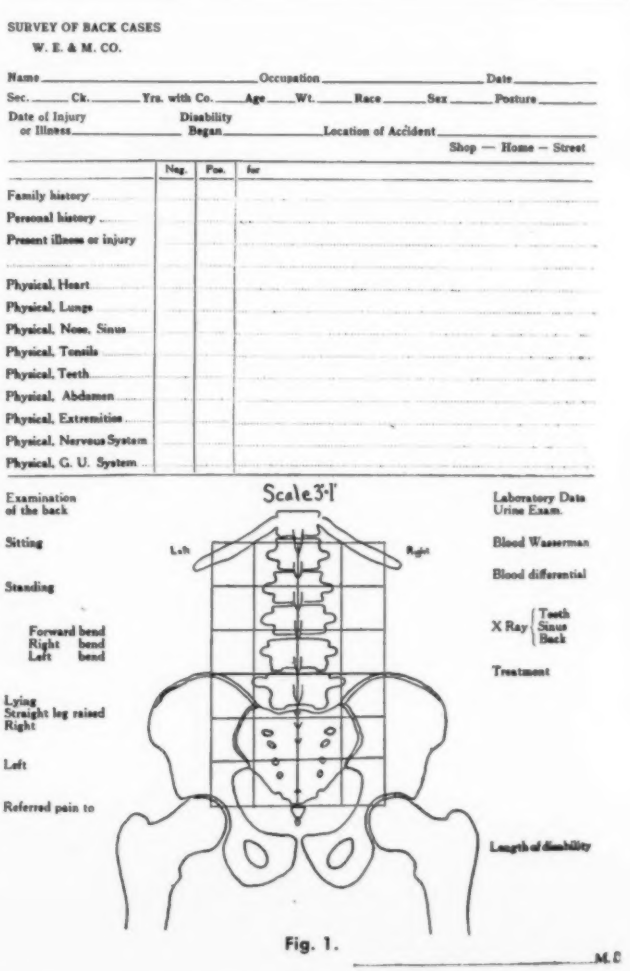


Fig. 1.

acute pain and muscle spasm salicylates in the form of aspirin were employed liberally, and in the case of severe pain a combination of codeine and aspirin was given. With this type of treatment morphine was rarely used. The importance of exercise in low back sprains must not be minimized, and these patients were carefully instructed in the proper use of graduated exercises of the back and legs. Along with exercise, every effort was made to educate the patient in correcting poor posture.

Treatment of sacro-iliac and lumbosacral sprains consisted of providing a fitted, light, low back support. It has been our practice, in those cases that did not respond to conservative treatment to refer them to a competent orthopedic surgeon. Patients with foci of infection were prevailed upon to have them surgically removed, if possible.

In rehabilitating those backs which were slow in responding to treatment, it has been the Westinghouse policy to return the injured employee to light work first, then gradually to his former occupation. In this series, it was found that 8% of the acute industrial backs were not able to return to some form of work within five days. In those cases, where the prolonged disability was probably due to underlying osseous pathology, the patient was able to report for work within a period ranging from 12 to 86 days.

The cases surveyed were studied exhaustively through history, examination, diagnosis, treatment, and length of disability. These painful back cases are an industrial problem because of their great number, and the difficulty of proper diagnosis and treatment. It was found that most of the cases were low back sprains of myofascial origin, with foci of infection contributory, and that the majority were caused by lifting. A very thorough examination was conducted on the patients, with the back findings being of the most help in diagnosis. A majority of the cases were diagnosed as acute back sprains, and conservative treatment was applied to each. The Westinghouse policy of giving a man easier work until his condition returns to normal, is a great factor in saving hours of labor. This policy permitted our cases with acute back sprain to return to work in three to five days. There was usually complete recovery within two to three weeks.

## Sulfallantoin in Industrial Medicine

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THE armamentarium of the industrial dispensary must of necessity contain those compounds that have been proved chemotherapeutically effective. Of prime importance is the selection of those drugs which will produce optimum activity with the least amount of discomfort, uneventful recovery and shortest time of disability. Thus, by the aid of such drugs the industrial physician can expedite the return to work of injured employees and thereby enable production of vital war industries to continue with the least amount of lost man hours due to accidents.

For over a year we, a heavy defense industry employing thousands, have been using, in our dispensary, a loose addition product of sulfanilamide and allantoin, known as sulfallantoin (p-amino benzene sulfonamide glyoxyldiureide). This compound combines two very important therapeutic factors which are desirable in the treatment of all types of injuries, that is, bacteriostasis (retards infection) and cell proliferant (favors rapid healthy granulation and epithelization). Both sulfallantoin powder and 2% ointment have been used on hundreds of our cases, with excellent results. Although its label carries the remark that "This material has a toxicity comparable to a similar amount of sulfanilamide given orally," toxic reactions and secondary infections have been minimum, and recovery time has been decreased, resulting in tremendous reduction of disability time.

The following examples will illustrate a few of the fields in which sulfallantoin powder and 2% ointment have been found effective:

### Eye, Ear, Nose and Throat

SULFALLANTOIN ointment has repeatedly been used in an eye which has shown conjunctivitis (followed by infection) due to foreign objects and other causes. It is sometimes merely placed under the lids, or on the lids themselves, or, a combination of both, with no dressing or with a dressing—and in no instance has there occurred an irritation due to the product. One notable instance of its success was a case of erysipelas following a superficial abrasion with marked swelling and redness. After the use of this product for 24 hours, the infection had subsided and there remained only a moderate edema. A second successful instance was that of an adult with severe acute gonorrheal ophthalmia, to such an extent that the physician felt he should be hospitalized. He had visioned the usual prolonged course followed in gonorrheal ophthalmia and the resulting fibrosis causing defective vision. However, the infection and inflammation subsided so rapidly that he would have assumed himself to have been mistaken in his diagnosis had it not been for the positive smear and heavy purulent discharge which existed at the beginning of treatment. Within 72 hours there remained practically no evidence of irritation, infection, or congestion, and smears were negative.

Sulfallantoin powder can be placed in an atomizer of the DeVilbis type for use as a spray in streptococcic throats with good results. The same procedure is used quite frequently in treating an exudative type of infection of the ear where a drying agent or dusting powder is desired.

Furuncles in the nasal cavity are treated with excellent results by simply coating a tampon with sulfallantoin ointment and placing it in the affected nostril, and holding it in place with an outside dressing, coated with the ointment. Such cases are cleaned up rapidly and without further difficulty. This result is obtained even though the furuncles are frequently assumed to be staphylococcic rather than streptococcic.

### Bursitis

MANY cases of olecranon bursitis commonly known as "miner's elbow" and prepatellar bursitis known as "housemaid's knee" have been seen. These generally contain a bag or cushion of fluid, either serous, hemorrhagic, or suppurative. Often there is an area of redness, swelling and tenderness, and at times induration, which indicates a superimposed infection. Previous treatments with various ointments, hydrotherapy, electrotherapy, or incision and drainage, with iodoform or rubber dam pack, proved to be slow and unsatisfactory. Such cases have been so numerous that we have developed a definite technique of treatment:

Our scalpels all have a slit in the handle. Into this

The sulfallantoin ointment and powder (P-amino benzene sulfonamide glyoxyldiureide) here referred to are manufactured by the Schuylkill Chemical Company.

slit is inserted a rubber dam about 1 in. by 5 in., very much like a thread in a needle. No anesthetic is used. The skin of the edematous area is prepared with antiseptic solution (e.g., tinct. merthiolate). An incision is made using a new, sharp, beveled blade in the side of the area and continued through the bag of fluid and out the opposite side, pulling the handle with the rubber dam through the incised wound. The rubber dam then remains as a through-and-through drain. By cupping the dam, sulfallantoin powder sprinkled in it is carried directly into the wound. The wound is then dressed with sterile gauze, and remains so for several days, depending upon the amount of drainage. When infection subsides or drainage ceases, the upper end of the rubber dam is cut to permit that opening to heal. The lower end remains open for any residual drainage. The remaining portion of rubber dam is shortened daily and removed when healing is complete. This procedure is often followed in hematomas.

### Burns

BURNS due to various causes (such as hot metal, fire, etc.), especially those showing a secondary inflammatory reaction, have been successfully treated with sulfallantoin ointment. However, certain burns which are due to molten metal heal very slowly and poorly with the use of sulfallantoin, as well as triple dye and more standard procedures, and as yet we have found no satisfactory healing agent for treatment. Where possible, and as early as possible, this type of wound is converted into a surgical incision by clean excision and suturing. Before tightening the suture, sulfallantoin powder is sprinkled into the affected area and rapid healing ensues, leaving a straight, clean scar.

### Wounds

SOILED wounds of all types, deep or superficial, even so deep as to require several layers of sutures to restore torn tendons, muscles, nerves, etc., all carry an adequate sprinkling of sulfallantoin powder. The end result generally is a reasonably rapid and uneventful recovery.

### Conclusion

SULFALLANTOIN has definitely shown itself to be of value in industrial medicine and has proved to be suitable, safe and harmless even in as delicate structures as the eye. Though it has not shown itself of value in certain staphylococcus infections, it has demonstrated its worth in the treatment of innumerable pyogenic infections. Both sulfallantoin ointment and powder have been found non-irritating and therapeutically efficacious. As a result of the use of this compound, disability time has been cut down to a great extent.

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INDUSTRIAL health experts have a concept of their work that extends far beyond the factory gate. Here is how J. J. Bloomfield, sanitary engineers with the U. S. Public Health Service, and one of the best men in the field, puts it: "Crowding, poor housing and lack of sufficient medical facilities, schools and recreation and other welfare services all combine seriously to threaten health and to disrupt normal family life. . . . True, there is a bigger job to be done in the plant itself—that is, a job of prevention. But even this cannot be accomplished without recognizing the influence of living conditions on absenteeism and industrial disability. This is a total war; half-way measures, half-way acceptance of responsibility and a half-way concept of the job will not win. In dealing with the worker one must adopt a concept of the 'total man,' if one is to keep him on the job and enable him to contribute to the common cause."

—In *P.M.*, New York City, September 9, 1942.

## Diagnosis of Source of Hematuria

*— Associated with Industrial Injuries —*

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IT IS NOT within the scope of this paper to deal with all of the sources of hematuria, yet because hematuria is such a common urological symptom, and because there are so many lesions which may account for the bleeding, and because so often the severity of the bleeding is not in keeping with the alleged insignificant industrial injury, it seems best to review briefly the non-traumatic sources of hematuria. The diagnosis of the source of hematuria in some cases is very easily made, while in others the source may never be found even after the most careful general and urological examination. Occasionally, even after an autopsy has been performed, the source of the hematuria may remain a mystery.

Dr. Eisendrath and Rolnick have very conveniently classified the various sources of hematuria as follows:

I. Systemic causes.
II. Lesions of the viscera immediately adjacent to the urinary tract.
III. Lesions of the genito-urinary tract. Of these three groups of causes, the genito-urinary lesions constitute about two-thirds of all.

FIRST, *Systemic causes of hematuria*:
- (a) Hemophilia.
- (b) Erythemia (true polycythemia).
- (c) Purpura hemorrhagica.
- (d) Leukemia.
- (e) Scurvy.
- (f) Hodgkin's disease.
- (g) Hematuria after high protein diet and after exertion. Schulte and Noltring found red blood cells in the urine of 84% of 50 young normal individuals and in 90% of men over 35.

SECOND, *Hematuria due to lesions of structures adjacent to the genito-urinary tract.*
- (a) Appendiceal hematuria.
- (b) Menstrual hematuria.

THIRD, *Lesions of the genito-urinary tract.*

A. Renal source of hematuria.
- (1) Polycystic kidney.
- (2) Tuberculosis.
- (3) Movable kidney.
- (4) Infections of the parenchyma, renal pelvis and ureter.
- (5) Neoplasms of parenchyma, renal pelvis and ureter.
- (6) Lesions of the renal papillae.
- (7) Renal calculi.
- (8) Hydronephrosis.
- (9) Embolism and thrombosis of renal vessels.
- (10) Hemorrhagic nephritis (essential hematuria).

B. Ureteral source of hematuria.
- (1) Neoplasms.
- (2) Ureteral strictures.
- (3) Ureteral calculi.
- (4) Ureteritis.

C. Vesical source of hematuria.
- (1) Neoplasms.
- (2) Adenoma and carcinoma of the prostate.
- (3) Calculus.
- (4) Simple and tuberculous ulcers.
- (5) Acute and chronic cystitis.

D. Urethral and (male) genital source.
- (1) Neoplasms.
- (2) Strictures.

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Presented at the Second Annual Meeting of the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, Del Monte, California, May 3, 1942.

Case No. 1
Run over by truck fracturing pelvis and rupturing posterior urethra. Cysto-urethrogram shows extravasated cystographic fluid in tissues. Patient was treated with suprapubic cystostomy and retention catheters. Later formed calculi in left kidney which required nephrectomy

Case No. 2
Patient sustained a crushing injury to the pelvis fracturing pelvis and rupturing bladder intraperitoneally. Was treated with suprapubic cystostomy and drainage

(3) Chronic anterior and posterior urethritis.
(4) Chronic prostatovesiculitis (bloody ejaculations).

After reviewing the many possible non-traumatic causes of hematuria, it is obvious that the source of the bleeding in a given industrial case, where the injury is of a minor character, may be very obscure and require a most thorough general and urological study. To judge whether the alleged injury actually did traumatize the urinary tract and produce the bleeding, or whether the injury aggravated an already existing pathological lesion or was coincidental only and played no part in producing the hematuria, is also many times exceedingly difficult. In border line cases, a complete urological study, including a cystoscopic examination with retrograde pyelograms, will answer these questions very satisfactorily.

The fact that practically every one of the non-traumatic lesions just mentioned has been encountered while seeking the source of "so-called traumatic" hematuria emphasizes the frequency with which patients

Case No. 3
Fig. 1. Sustained a blow to the right side of abdomen and low flank, causing shock and immediate gross hematuria. Scout film of the abdomen shows left kidney shadow and psoas muscle outline normally. Right kidney and psoas muscle is not delineated, indicating injury to the right kidney with hemorrhage into tissues

Case No. 3
Fig. 2. Intravenous pyelogram shows no function in right kidney, confirming diagnosis of injured right kidney. Left kidney shows fairly normal values. Patient recovered without surgical interference

Case No. 4

**Fig. 1. Questionable injury to abdomen, however, patient had severe gross hematuria. Right kidney and psoas muscle well delineated. Left kidney and psoas muscle not delineated. There appears to be a mass in the region of the left kidney**

**Fig. 2. Intravenous pyelogram shows normal values for right kidney and no function on the left, confirming our diagnosis of pathology in the left kidney**

associate their hematuria with their work. Invariably and quite naturally the patient will believe that his hematuria is the result of his work. With a little encouragement he will often relate very vividly a story, which he thinks is a likely one. The possibility of a minor injury causing hematuria is very remote. It is very singular that the more insignificant the injury the more profound the lesion found causing the hematuria will usually be.

Trauma to the body, severe enough to produce an injury to the genito-urinary tract, followed by sudden gross hematuria, is always accompanied by some degree of immediate shock and usually is followed very shortly by discoloration and swelling over the area injured. This statement holds true, especially where the injury is of the "straddle variety" or a blow over the kidney fracturing ribs. A blow to the abdomen, rupturing intraperitoneally a full bladder, may not be accompanied by tumefaction or external discoloration but shock will be present. Thus, the search for the source of gross hematuria following a bona fide injury begins with a thorough inquiry into the mode and severity of the injury, combined with a thorough physical examination.

Case No. 4

**Fig. 3. Carcinoma left kidney removed for persistent gross hematuria. Patient's history of injury was not substantiated by investigation**

The source of the hematuria may be very obvious from the history alone, yet other diagnostic procedures are necessary to determine the severity of the injury. Of these diagnostic procedures the x-ray is most valuable. Fractured ribs, associated with hematuria, usually means an injured kidney, especially when the intravenous pyelogram reveals little or no function on the injured side with a fairly normal function in the opposite kidney. Add to this picture the blotting out of the psoas muscle on the injured side and the diagnosis is confirmed.

The intravenous pyelogram serves a dual purpose. It helps to determine the damage done to the injured kidney and is a good index of the function and health of the opposite kidney.

A crushing injury to the pelvis, accompanied by fractures of the pelvic bones, associated with hematuria or free bleeding from the external meatus, indicates that a severe injury has occurred to the lower urinary tract. An intravenous pyelogram is indicated immediately to rule out upper urinary tract injuries and pathology. The intravenous pyelographic fluid may outline a normal intact bladder as well as normal kidneys with urine extravasating at the base of the bladder after voiding, as a result of a rupture through the prostatic area. If extravasation in the true pelvis is not found by the intravenous pyelographic method,

a cystogram should be done under very strict asceptic conditions. A soft rubber catheter is passed if possible. It may be necessary to use a catheter over a stylet to negotiate the entire urethra. The character and amount of urine obtained and any obstruction met should be carefully noted and the bladder filled with a measured amount of 10% solution of sterile pyelographic media by the low gravity method, taking a picture when the bladder is thought to be full. The fluid is then withdrawn and measured again and a second picture taken to determine the presence of extravasation. Cystograms can be repeated if necessary without distress to the patient. If some of the pyelographic fluid enters the abdominal cavity there is usually no need for worry.

The procedures as just outlined for the diagnosis of the source of gross hematuria, accompanied by severe injuries, can be carried out with the patient on the x-ray table with the very minimum amount of manipulation and moving, during which time x-ray pictures of other parts of the body can also be taken and the patient treated for shock simultaneously.

### Conclusions

COMBINING the three x-ray procedures; namely, a scout film for fractures, an intravenous pyelogram to determine kidney injuries and a cystogram to outline the bladder and urethra, the cystoscope is seldom ever needed early to make an accurate diagnosis of the source of gross bleeding due to severe injuries of the genito-urinary tract, while on the other hand a complete cystoscopic examination with retrograde pyelograms is necessary in localizing the source of the hematuria when it is allegedly due to some minor injury.

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## Resuscitation

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RESUSCITATION is bringing back to life one who is apparently dead. To do this, artificial respiration must be resorted to, since in all such cases the victim has stopped breathing or the breathing is very poor. Artificial respiration is precisely what the name implies. It makes the patient breathe artificially until nature establishes normal respiration. There are many causes of cessation of respiration, the most frequent being electrocution, carbon monoxide and other gas poisoning, drowning, ingestion of certain drugs, injury to the head or abdomen, and various diseases affecting the nervous system.

Before entering into a discussion of artificial respiration, a few remarks should be made concerning normal breathing. The purpose of respiration is to take air which contains about 20% oxygen into the lungs. This oxygen is absorbed by the blood in the fine capillaries in the lung tissue and carried to every part of the body by the circulation. Oxygen is essential for the life of all tissues and when a tissue's oxygen supply has been stopped or diminished, the cells of the tissue degenerate and die. Nature has provided a reserve supply of everything the body needs, to be used in cases of emergency, such as fats, water, salts, sugar, and so on, and there is enough of these substances stored up in the tissues to last many days, with the exception of oxygen. The only reserve supply of oxygen is that in the blood and the small amount in the air in the lungs, which it has been estimated, is barely enough to last 10 minutes. After this period of time, certain cells of the body, particularly the brain cells, which cannot stand oxygen-lack as well as other cells, degenerate and die. Once a brain cell suffers a necrosis it is never replaced, thus giving rise to permanent damage and perhaps death. This oxygen-want in the tissues is known as anoxia. In most cases if the anoxia has not been too severe, nor over an extended period, there is created only irritation of the cells without degeneration, in which cases, if respiration is established quickly, this irritation will clear up and not go into the stage of degeneration and necrosis. If oxygen is available and can be given in conjunction with artificial respiration with a proper mask, better results are obtained. Since the blood derives its oxygen supply from the air in the lungs, the importance of giving artificial respiration before the 10-minute period has elapsed, can be seen readily. Carbon dioxide in the blood is the normal stimulus to the respiratory center and if added to the pure oxygen to the extent of 5 to 7%, given in conjunction with the artificial respiration, the rate and depth of respiration will be increased. In carbon-monoxide poisoning there is a paralysis of the respiratory center due to the anoxia in the medulla causing a cessation of respiration, but the heart may continue to beat for some time after. In electrocution just the opposite is observed. It is obvious why immediate and efficient first-aid treatment is a very important factor in gas cases. In those severe gas cases I have attended, all unconscious and many in which the breathing had stopped and in any case where there was any sign of life whatsoever, they all recovered and there were no serious after-effects. I attribute this to prompt and efficient first-aid treatment.

Artificial respiration may be divided into two kinds: the manual method and the mechanical method. Both have their advantages and disadvantages. The manual method has the advantage in that no apparatus is required. This method is easily taught, and sufficient employees have been trained in its use; however, it is very tiresome and the amount of good done depends a great deal on the skill of the operator. These points will be discussed later in this paper.

The history of artificial respiration dates back to Biblical times where mention is made of lives being saved by mouth to mouth insufflation. This is still one of the best methods, as the exhaled breath of the operator contains about 5% carbon dioxide, the normal stimulus of respiration. It has its advantages and disadvantages but is still frequently used in resuscitation of the new-born baby with very good results. It may do harm, however, if too much pressure is used.

The modern history of artificial respiration began about 1775 when the Dutch Humane Society advocated mouth-to-mouth insufflation, along with rectal instillations of tobacco smoke, bleeding, external heat, etc., in cases of drowning. Later, Hall and Howard resorted to rolling the victim on a barrel, or rolling him from supine to prone position.

In 1858 Sylvester brought out another method. In this, the patient is placed on his back with his arms folded over the lower part of the chest. The operator stands at the head of the patient facing his feet. He then reaches down and grasps the wrists and pulls both arms up in a semi-circle until they touch the floor. This increases the size of the chest cavity and the air will rush into the lungs. The arms are then moved back to the original position, folded over the chest, and pressure is made on the lower part of chest, still holding the patient by the wrists. This second movement forces the air out of the lungs. This method was in use until about 1903 when it gave way to the Schafer prone

Read before the American Congress of Physical Therapy, at the William Penn Hotel, Pittsburgh, September 9-11, 1942.

pressure method of today. The Sylvester method is very tiresome to the operator; the supine position does not promote the clearing of the throat of mucus, vomitus, etc., which may greatly impede resuscitation; it cannot be used in fracture of the arms or shoulder girdle but it has been successful in many cases.

In 1903 Edward A. Schafer gave his first account of the prone pressure method. This method gives a greater exchange of air in the lungs and also promotes evacuation of foreign material and mucus from the throat, as well as causing the tongue to fall forward by gravity instead of backward causing occlusion of the respiratory tract. He gives the following table showing the amount of air exchange: Normal respiration 450 cc.; Sylvester method 175 cc.; Schafer method 520 cc. Of course in any method the exchange depends on the skill of the operator.

A brief description of the Schafer method is as follows:

Place victim on abdomen, one arm extended directly over the head, the other arm bent at the elbow with face turned outward resting on the forearm so that the mouth and nose are free for breathing.

Kneel astride of the patient's thighs, placing the palms of both hands on the small of the back with the fingers resting on the ribs, the little finger touching the lower rib and the tips of the fingers just out of sight.

Lean forward slowly so that the body weight is brought gradually to bear on the chest, keeping the arms absolutely straight without bending the elbows. This forces the air out of the chest.

Swing back to the original sitting position, removing the pressure completely. The elasticity of the chest walls causes the chest to return to its normal shape and the air is sucked into the lungs.

In order to get the best results, regardless of the method used, there must be some rhythm to the operation. It should not be too fast nor too slow. A good plan is to teach the operators to say, as they apply pressure, OUT GOES THE GAS and then as they come back to the original position, IN COMES THE AIR which consumes about four seconds of time, 15 respirations per minute.

Artificial respiration should be continued without interruption until normal breathing is established, three hours or longer, or until the patient is pronounced dead by a doctor. After discontinuing the artificial respiration, the breathing should be carefully watched because it often happens that the breathing stops or becomes poor again, necessitating continuation of the artificial respiration.

ARTIFICIAL respiration should be started immediately on discovery of the victim at the site of accident, but if it is necessary to move patient there should be no interruption in the treatment. Time is of paramount importance in the management of asphyxia. It is easy to cope with slight asphyxia, whereas it is very difficult, if not impossible, to resuscitate after the heart has ceased to beat. The longer the period the victim has stopped breathing, the more difficult it becomes to start it again and the longer artificial respiration will be required before he is revived.

In recent studies of cases of electric shock by the Harvard Medical School, it was indicated that 70% recovered if artificial respiration was started within three minutes. This recovery rate drops to 58% if not started for four minutes. This research brought out the fact that continued artificial respiration for an extended period is necessary, and no person should be pronounced dead until 12 hours of artificial respiration have been tried or until rigor mortis has set in.

Other points to be remembered are: loosen tight clothing about the neck, chest, and waist; see that the throat and mouth are cleaned of all foreign material such as false teeth, tobacco, food, gum, etc.; do not forcibly restrain as it causes exertion on part of the victim; keep warm with blankets and external heat; massage muscles to stimulate circulation; give no liquids by mouth while patient is unconscious; keep head down and treat as a case of shock; after the victim has been revived keep in bed and avoid all exertion on account of the heart which has been weakened by the anoxia. The use of respiratory and heart stimulants seems to do little good. Venesection, blood transfusions or injections of oxygenated saline solutions are not only valueless but also may prove harmful.

Several other comments on the prone pressure method should be made. Sudden snapping back of the hands appears dramatic but serves no useful purpose; the idea that if the patient is breathing at all, no artificial respiration should be given as it may not be in rhythm with his normal breathing, is erroneous; whether or not the hands should be removed from the chest after pressure has been applied, is a question for argument. It is more restful for the operator but there is no difference in the results obtained if the operator works with mechanic-like smoothness and with no abrupt motion at any time. Old people and young children should be handled carefully, since harm might be done such as broken ribs, etc. In pregnant women and in cases where there has been a recent abdominal operation, the Sylvester method should be used, as well as in cases where there have been broken ribs or vertebrae and bad burns of the chest. The reason here is obvious.

Regardless of what method is used, it is always advisable to give oxygen, if available, in connection with the artificial respiration. I know of no condition where it is not indicated. There are many ways of administering oxygen but the most efficient way is with some sort of apparatus having a tightly fitted mask and a large breathing bag. The H & H Inhalator, the inhalation device on the E & J pulmotor, and the Atmos inhalator are the most prominent machines today. The latter has no breathing bag but is so constructed that the patient gets as much oxygen as he wants, due to a bellows-and-trigger arrangement. Another means is by the intra-nasal catheter but this is hardly applicable to first-aid work. The funnel and wash-bottle method is not used because the oxygen is too diluted on reaching the nostrils.

There has always been quite a controversy over the merits of the manual and mechanical means of artificial respiration. The mechanical method in fact has been condemned by various commissions up until quite recently, when the E & J resuscitator was accepted by the A.M.A. Council on Physical Therapy. The faults found against this method have been mostly by men who never had had any practical experience with it, and who, on theory alone, say that it may do harm to the lung tissue; that there may be a tendency to wait for the arrival of the apparatus instead of performing artificial respiration immediately; that the patient might offer a resistance to the machine causing a rapid alteration from pressure to suction; that the machine may be out of rhythm with the victim's normal breathing; that the rhythm may be too fast or too slow; that the oxygen may go into the stomach instead of the lungs; that there was danger of forcing infected material into the lungs causing irritation and possibly pneumonia; that it requires someone trained in its use; that it is liable to get out of order and not work.

In answering these statements, I would like to say that the mechanical method is used only where the respiration has stopped or the breathing is very poor. In these cases, consciousness has been lost and there is no resistance by the patient to the pressure and suction. It might be well to mention here that it is impossible to use either E & J or pulmotor on a conscious or semi-conscious patient due to the resistance offered. When the victim is breathing of his own accord, or is conscious or semi-conscious, there is no necessity for using the resuscitator and the machine can be shifted over to the inhaling device or oxygen may be given in the various ways already mentioned. As to the rhythm being too fast or slow, the pulmotor is set for 16 times per minute while in the E & J there is a means of regulating this to any number desired; the statement that it might cause lung rupture or injury to the lung tissue is unfounded. In my 33 years' experience, in which this method was used hundreds of times, as well as information from other doctors who have had considerable experience with this method, there never has been a case of any ill effects. Cases have been reported of lung injury, but this was due to other causes. As to the criticism that valuable time might be lost awaiting the arrival of the apparatus, no one at this late date, after so much has been said about first aid, would stand around and wait, doing nothing. As to the oxygen going into the stomach, I might say I have listened many times with a stethoscope and found this not to be the case. However, pressure over the stomach will prevent this, if in doubt. Like any other apparatus, there is a possibility of a machine getting out of order, but I have never found this to be true. Any machine must have periodical inspection. As to forcing infected material into the lungs, I believe this is of little importance, and it must be remembered that we are trying to save the life of one who is on the verge of death and we must resort to heroic means. In a recent article by Birnbaum, Thompson and Ostrow* the following statements appear: Rhythmatic inflation and suction was by far the most efficient method (in their experiments). The suction and pressure method within safe limits of suction and pressure rests on sound physiologic principles; it does not depend on the muscle tonus of the respiratory muscles as in the manual method for expiration; out of rhythm with the machine indicates return of spontaneous breathing and time to desist from the use of mechanical means; the mechanical method gives a distinctly greater pulmonary ventilation and is far superior to the manual method when respiration has stopped.

Of the various machines used in the mechanical method of artificial respiration there are only three worthy of note, the E & J, the pulmotor and the Drinker iron lung. The first two act in practically the same manner, causing an interchange of air in the lungs by pressure and suction, which, I believe, is a step in advance of any other method. There is a far greater exchange in the lungs, the E & J giving pure oxygen and the pulmotor about a 47% mixture of air and oxygen. The pressure and suction are far within the limits of safety (E & J pressure three ounces—Suction 2 ox., Pulmotor 4.6 & 5.9 ox.) and the pressure causes the blood plasm to absorb a small amount of oxygen in addition to that carried by the corpuscles. They are entirely automatic and do not depend on the skill of the operator, ventilating the lungs by pressure and suction regardless of the amount of carbon dioxide in the blood. They require only one operator, there is no manual labor, and they can be used in cases where the manual method would be harmful such as in fractured ribs, severe burns over chest, internal injury, pregnancy and after recent abdominal operation.

The Drinker respirator, or iron lung, is a cylindrical air-tight chamber, large enough to encase the whole body, with the exception of the patient's head which protrudes through a soft rubber collar. By means of a motor, the air is exhausted from the chamber creating a partial vacuum, causing the chest to expand and the air from the outside to be drawn into the lungs. When a certain point is reached, the vacuum is automatically released and the elasticity of the chest walls causes expiration. Patients have been kept alive for months and even years, in one of these machines, but, being cumbersome and expensive, they are not suitable for first-aid work.

In conclusion, I would like to emphasize the importance of prompt and efficient first-aid treatment using the prone-pressure artificial respiration, in conjunction with inhalations of pure oxygen when available, and the use of the mechanical method if the patient has stopped breathing, providing the apparatus is at hand but not to wait until its arrival.

*J.A.M.A., April 18, 1942.

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## First Aid for the Industrially Injured

*—By Whom, With What, and How Much?—*

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*Industrial Health Physician, State Board of Health, Missouri*

FIRST AID in the smaller plant has always presented a problem. Owing to the tremendous step up in production, these industrial accident first aid problems have been multiplied and magnified, and are now clearly silhouetted against their background. This article is presented for the purpose of reviewing the present situation, and to make what are considered some pertinent suggestions.

Injuries in the large plant have been numerous enough to justify the employment of trained nurses if not the establishment of complete medical programs. These plants, with professional personnel whose medical supervision is adequate and who are capable of facing legal liability, will not be referred to here.

The two remaining classes of plants may be identified for purposes of discussion as:

(A) Those plants whose accidents are too few to justify the full time activity of any employee, and

(B) Those plants, or projects, whose accidents are numerous enough to have resulted in the employment of full time individuals whose training does not meet professional standards or who are not under direct medical supervision.

CLASS A: In regard to the A plants, those who have assigned some employee to the handling of the occasional accidents as they arise, there are three factors involved:

1. QUARTERS—Adequate quarters are not available for first aid in most small establishments, and to expect them to be made available, particularly at this time, would be idealistic but impractical. As in street injuries or war wounds, first aid treatment must be carried out by making the best use of the facilities at hand. Even under the most cramped or crowded conditions there is always some space available, or which may be cleared, to allow a patient to lie prone on the floor and be the subject of first aid treatment.

2. FIRST AID EQUIPMENT—Adequate first aid equipment should always be available. If it is not, it is evidence of thoughtlessness, or unwarranted optimism. What constitutes adequate equipment may be, and is, the subject of endless debate which leads to the con-

clusion that there is no absolute inflexible standard. It requires a minimum of supplies, but whether this minimum list is that of the Red Cross, the Bureau of Mines, the local health agency or entirely personal is not relative. Whether there are one or two packages of gauze does not matter so long as gauze, clean and fresh, is readily available. Whether there are six one-inch and 12 two-inch bandages or 10 of each in the kit is not important so long as there is a supply of clean bandages accessible. These remarks may seem gratuitous, but they are prompted by the frequent observation of first aid kits made worse than useless by raiding, carelessness, the sabotage of mishandling, cotton opened and exposed to dust and dirt, bandages unrolled and ruined with spilled medication, gauze opened and stained with fountain pen ink, and countless parallel conditions. This is shocking to those who have supplied the kit to be used in emergency, and may result in prolonged disability or worse for those whose welfare and lives are depending on these supplies at the time of injury.

3. THE PART TIME ATTENDANT—This attendant is usually recruited from the office staff or may be an operator or a supervisor. His (or her) qualifications consist primarily of availability. Once assigned to this duty, his training may consist only of the trial and error of experience, or he may seek the formal education of a Red Cross course. Occasionally some have had some similar experience or training elsewhere. Their attitude is modified by their personal interest and experience, and may vary from the extreme of timidity to the recklessness of enthusiasm, or original caution may be gradually replaced by flamboyant aggression in treatment.

Where three shifts are employed the two extremes may be demonstrated in the same plant within 24 hours. Uniformity is not usually found in the same plant, let alone in any given number of plants. This lack of uniformity is evidence of the lack of training, preparation or guidance of these part time "first aiders." Were they all encouraged to take the Red Cross course it would be of considerable help to them personally and would assure the injured of the benefit of this minimum standard. It would give some assurance to those who are still on the timid side of the picture, and orient them to the possibilities with which they may be faced. By those, however, who are over enthusiastic, the limitations of the first aider as taught by the Red Cross course are likely to be ignored as not applying to them, and their ego is not likely to be deflated until their over ambition has resulted in some medical disaster which, too late, impresses them with their responsibility.

For neither category is a Red Cross first aid class adequate preparation. It must be supplemented by some form of supervision. There seems to be no other source for this supervision than the doctor to whom the serious cases are referred. He may not be recognized as the "plant doctor" or think of himself as such. His connection may be only indirect, through the insurance company, but he is, nevertheless, the one on whom this supervision must fall. He may never have been in the plant if his first introduction to the injured has been in his office or at the hospital. As yet there is no short cut in the way of standing orders, etc., available to relieve him of the necessity of personally supervising and educating, if only in a broad way, the extent of the service on the part of the first aider which he considers adequate. Time may develop courses, either personal or textbook, which will lay a pattern for this class of attendant. In the meantime it would behoove each management, directly or through its insurance carrier, to invite the doctor to whom its cases are referred to inspect personally the first aid facilities and undertake some supervision of those who practice first aid.

CLASS B—In those plants or projects whose accidents are numerous enough to have resulted in the employment of individuals who are not professionally trained nor under direct supervision, while quarters and supplies are usually quite adequate, this is a major problem and presents conspicuous examples of lay personnel taking over a large part of what is traditionally and legally the practice of medicine. It is true that this is not the time to split hairs over technical points in responsibility, or to mark the inter-provincial border with a hairline. Personnel shortage and expediency would mark any academic discussion as untimely. The extremes, however, of responsibility assumed and the surgical and medical liberties taken by many of these attendants more than justify a note of caution if not a "view with alarm."

Will there have to be some spectacular catastrophes or publicized lawsuits to bring home to the employer and/or his insurance carrier the need for these attendants to keep on safer ground? This is a larger problem than can be solved by the first aid course and the supervision of the local doctor. It must be met by those responsible for the management of these projects or the insurance carriers of these risks. To the enormous amount of material, labor and technical staffs which they are already supplying on these projects, must be added at least sufficient medical supervision to insure that practices will not be initiated or continued which will result in damages, civil to the employer and physical to the employees.

Add to the accident phases discussed, the drugs, medication or treatment offered by the unlicensed and untrained for non-occupational sickness or injury, and the resultant responsibility assumed by the employer for a potentially serious condition for which he was not originally responsible, and the need for supervision is more than ever emphasized.

In conclusion, may we suggest that each management, each insurance carrier and each physician in any way connected with a plant, ascertain what first aid equipment is available at the plant, who is rendering what first aid care, and whether they are subjecting themselves or the employees to unjustified risks through inadequately supervised service.

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## The Effects of Fiberglas on Animal and Human Skin

*—Experimental Investigation—*

MARION B. SULZBERGER, M.D., *and*
RUDOLF L. BAER, M.D.,
*With the Technical Assistance of*
CLARE LOWENBERG, M.S., *and* HILDEGARD MENZEL, B.S.

FINE, flexible glass fibers which can be woven into fabrics, or fabricated into bats, blankets and rigid or semi-rigid sheets, were first produced on a commercial scale in 1932. Known as Fiberglas, this new type of glass is produced and fabricated by Owens-Corning Fiberglas Corporation, and in its various forms is widely used for electrical and thermal insulation purposes.

From time to time during the past 10 years, newly employed workers unaccustomed to handling Fiberglas

From the Department of Medicine, New York University College of Medicine and the Third (New York University) Medical Division, Welfare Hospital, Welfare Island, New York.

material, have experienced skin discomfort which disappeared, apparently, when they became hardened to the action of the fibers. The period of initial discomfort seldom exceeded a few days.

Although experience indicated that the irritation was of a purely transitory and superficial nature, Owens-Corning Fiberglas Corporation, manufacturers of Fiberglas, desired to obtain authoritative medical evidence that would support or disprove the evidence of experience. The authors of this report were requested to conduct an investigation to determine the nature and effect of the irritation.

Laboratory animals and human beings were employed as subjects for experimentation.

### Animal Experiments

SIXTEEN rabbits were first rubbed, over a period of a month, with two Fiberglas materials in the wool-like form, and with two competitive materials (materials made from substances other than those from which Fiberglas is made, but employed for some of the purposes for which Fiberglas is used).

Each animal was rubbed on six sites. One site was rubbed with each of the materials mentioned. In addition, two sites on each animal were rubbed with absorbent cotton as control sites.

Depilation was performed 24 hours preceding the first rubbing, and then as often as required, with barium sulphide paste. The treated areas were on the belly, and each area rubbed was 4.5 cm. in diameter. A standard time of two minutes for each rubbing was established and maintained. Rubbings were performed almost daily except Sundays and several Saturdays, or when individual sites were too irritated to permit rubbing.

Twenty-six guinea pigs were rubbed in the same manner, for an equal period, with the same materials; but in addition each animal was rubbed on additional sites with two Fiberglas textile materials (continuous filament and staple fiber) in fabric form. Twelve guinea pigs were then rubbed with the wool-like form, and with one of the competitive materials. The rubbing period varied from animal to animal and from site to site, ranging from three to nine days.

The reactions observed, both in rabbits and guinea pigs, were all based on the mechanical action of the different materials. The reactions on the rabbits, when they appeared after repeated rubbings, usually consisted of faint redness, scaling and superficial yellowish crusting. In general, the reactions of the guinea pigs' skins were somewhat more intense than those of the rabbits' with more erythema and crusting.

### Human Experiments

TEN human subjects—six male and four female—were rubbed, over periods ranging from seven to 19 days, with the two Fiberglas materials in the wool-like form, one of the competitive materials, the two Fiberglas textile materials in fabric form, and with absorbent cotton as a control.

The normal skin of the flexor surface of the forearm was used. Three sites on each forearm, each about 4.5 cm. in diameter were rubbed. Each site was rubbed daily, except Sunday, for two minutes.

On the same subject, the same material was always rubbed in at the same site; but on different subjects, differently situated sites were chosen for the different materials. This was done in order to avoid any possible error which might occur due to the potential differences of sensitivity of different parts of the skin.

In addition to the sensory disturbances at the time of rubbing, there was some pain and discomfort for some time after the application, particularly when clothing pressed against rubbed site. This discomfort after each rubbing usually lasted no more than a few hours.

Astonishingly enough, even when the objective signs of skin irritation increased with each rubbing, subjective manifestations were not intensified. On the contrary, the subjective manifestations of the second, third or fourth times of rubbing were generally less than those of the first rubbing.

The objective reactions consisted of erythema, swelling, pin-head-sized papules soon after the rubbing, followed within a few hours by erythema, scaling and varying degrees of crusting. Later, after several rubbings, there were persistent papules, lichenification, scaling, thickening and roughness of the skin surface, and varying degrees of hyperpigmentation.

### Sensitization Experiments

IN EXPERIMENTS designed to determine whether any specific sensitizations of skin were produced, eight of the original rabbits, 29 of the original guinea pigs, and all of the original human subjects were subjected to a test exposure of each of the materials that had been used originally. In order to allow for a possible incubation period of sensitization, at least two weeks were allowed to elapse between the last rubbing and the test rubbing.

The responses elicited from the animals were essentially identical to those produced by the first rubbings in animals never exposed to the materials. There were no signs of accelerated response, intensification of reaction, lessening of reaction, delay of response, or any other evidence of difference when compared with the results of the original application of the material. There was no evidence of sensitization or desensitization of the skin.

In the case of the human subjects, no marked degree of sensitization was produced to any of the materials, even under the severe conditions of the original exposures. It is very questionable whether, even in several instances of mild evanescent reaction, specific sensitization played a role. If sensitization did exist, it must have been practically negligible.

### Histological Examinations

HISTOLOGICAL examination of the reaction sites in animals and human subjects showed evidence of a superficial inflammatory process. Although the clinical examination of the sites rubbed with the different materials revealed marked changes in the degree of reaction, the histologic changes in all sites, including the sites rubbed with absorbent cotton, were of approximately the same type.

The histologic sections did not show any evidence of permanent damage, and the epidermis was generally found to be intact and undisturbed in its continuity. Special methods of fixation which were designed to retain clinically visible glass spicules sticking into the skin, were used in the attempt to demonstrate these spicules in the histologic section. However, in none of the many slides examined could the glass spicules be seen.

This, together with the fact that no disturbance in the continuity of the horny layer of the epidermis was seen, suggests that the spicules which were seen clinically after the rubbings, were only very superficially embedded. No foreign-body reaction was seen in any of the sections examined, thus demonstrating that no fragments of the various materials used in these experiments had penetrated into the deeper layers of the skin.

**Conclusion**

ALL OF the reactions observed were of a transitory and superficial nature. The only parts of the reactions which persisted for more than a few days were slight thickening and brownish pigmentation of the skin. The latter were sometimes apparent for several weeks. No reactions or symptoms outside the rubbed skin areas were observed at any time during the experiment.

The minute pieces of material which were seen sticking into the skin after rubbings with Fiberglas in its wool-like form appeared to be very superficially embedded. This observation was borne out by the fact that ordinary washing with water easily removed a large part of the spicules remaining in the skin after rubbing.

No definite sensitization to any of the materials could be demonstrated. In a few subjects there were a few mild and evanescent reactions to several of the materials, but it appeared very questionable whether these reactions were based on specific sensitization.

The biopsies of all specimens taken from various sites in animals and humans showed a superficial inflammatory process. Sites on human subjects which had been rubbed with the Fiberglas continuous filament and staple fiber presented such mild clinical reactions that it appeared unnecessary to take biopsies from them.

There were no significant differences in the types of histologic reaction produced by the other materials. No spicules or pieces of materials, and no foreign reactions, could be demonstrated in any of the histologic sections.

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## Instructors in Industrial Medicine

*—Long Island College of Medicine—*

THE intensive post-graduate course in industrial medicine at LONG ISLAND COLLEGE OF MEDICINE, Brooklyn, New York, November 2-13, 1942, was outlined as to subject matter in INDUSTRIAL MEDICINE for September (pp. 419-422). It was also stated that arrangements have been made to provide a limited number of "internships" in the medical departments of industrial establishments for those who desire further training. The tuition fee, announced at $75.00, has been reduced to $50.00.

The course will be conducted primarily by physicians in industrial medical practice. The main objective is to give those physicians engaged in or who may enter industrial medicine the opportunity to orient themselves more fully in the field.

The leaders in industrial medicine who will deliver the lectures and conduct the seminars are as follows:

J. A. CURRAN, M.D., President and Dean, Long Island College of Medicine.

W. IRVING CLARK, M.D., Medical Director, Norton Company.

WILLIAM A. SAWYER, M.D., Medical Director, Eastman Kodak Company.

CASSIUS H. WATSON, M.D., Medical Director, American Telephone & Telegraph Company.

MELVIN N. NEWQUIST, M.D., Medical Director, The Texas Company.

JOHN M. CARLISLE, M.D., Medical Director, Merck & Company.

MISS MARION G. DOWLING, R. N., The Lowe Paper Company.

L. E. HAMLIN, M.D., Medical Director, American Brake Shoe & Foundry Company.

MELVILLE MANSON, M.D., Medical Director, New York Telephone Company.

LOYAL A. SHOUDY, M.D., Chief of Medical Service, Bethlehem Steel Company.

T. LYLE HAZLETT, M.D., Medical Director, Westinghouse Electric & Manufacturing Company.

MARTIN I. HALL, M.D., Medical Director, New Departure Division, General Motors Corporation.

J. DEWEY DORSETT, Manager, Casualty Department, Association of Casualty and Surety Executives.

IRVING GRAY, M.D., Chairman, Sub-Committee on Industrial Health, Kings County (N.Y.) Medical Society.

HENRY D. SAYER, General Manager, Compensation Insurance Rating Board.

DAVID J. KALISKI, M.D., Director, Workmen's Compensation, New York State Medical Society.

CLARENCE D. SELBY, M.D., Medical Consultant, General Motors Corporation.

MCIVER WOODY, M.D., Standard Oil Company of New Jersey.

LEONARD GREENBERG, M.D., Director of Industrial Hygiene, New York State Department of Labor.

J. J. WITTMER, M.D., Medical and Personnel Director, Consolidated Edison Company.

LYDIA GIBERSON, M.D., Psychiatrist, Metropolitan Life Insurance Company.

LOUIS PINK, Director, New York State Department of Insurance.

KINGSLEY ROBERTS, M.D., Director, Medical Administrative service.

GEORGE D. OLDS, Assistant to the President, Continental Oil Company.

PETER IRVING, M.D., Secretary and General Manager, New York State Medical Society.

LOUIS HOLLANDER, General Manager, New York Joint Board; Vice-President, Amalgamated Clothing Workers of America.

LIEUTENANT-COMMANDER L. J. GOLDWATER, Industrial Health Officer, New York Navy Yard.

LEVERETT D. BRISTOL, M.D., Health Director, American Telephone & Telegraph Company.

CHARLES GRAHAM-ROGERS, M.D., Associate Industrial Hygiene Physician, New York State Department of Labor.

GEORGE H. GEHRMANN, M.D., Medical Director, E. I. du Pont de Nemours Company.

R. A. KEHOE, M.D., Director, Kettering Laboratory of Applied Physiology, College of Medicine, University of Cincinnati.

JAMES H. STERNER, M.D., Laboratory of Industrial Medicine, Eastman Kodak Company.

LEROY U. GARDNER, M.D., Director Saranac Laboratories for the Study of Tuberculosis, Edward L. Trudeau Foundation.

JOHN J. FOULGER, M.D., Director of Research, Haskell Institute of Industrial Toxicology, E. I. du Pont de Nemours Company.

LOUIS SCHWARTZ, M.D., Medical Director, Division of Industrial Hygiene, U. S. Public Health Service.

JOHN J. MOORHEAD, M.D., New York City.

ROBERT S. GOODHART, M.D., Technical Adviser, Industrial Nutrition, Office of Defense Health and Welfare Services.

NORMAN JOLLIFFE, M.D., Associate Professor of Medicine, New York University Division, Bellevue Hospital.

THOMAS D. DUBLIN, M.D., Associate Professor, Department of Preventive Medicine and Community Health, Long Island College of Medicine.

CARL M. PETERSON, M.D., Executive Secretary, Council on Industrial Health, American Medical Association.

LIEUTENANT-COLONEL HENRY VAN ZILE HYDE, M.D., Medical Officer, 2d Civilian Defense Region, Office of Civilian Defense.

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RECORDS of the Indiana Industrial Board reveal that more than 15,000 workers in Hoosier industry were injured in factory, shop, and mine accidents during the first six months of this year. Attaches of the board estimated that the accident toll for the year will be between 32,000 and 33,000 workers, as compared to an approximate 25,000 last year. The increase, obviously, is the result of stepped-up employment due to Indiana's important role in the industrial phase of the war effort. Exact total of injured for the half-year period was 15,124.

## Designs for War

NEWSWEEK, September 14, 1942, under the title, "Sperry, Style Setter," has the following:

"It had to be a uniform that was practical, and at the same time so good-looking that the girls would be proud to wear it to work, for 'factory space for changing clothes is precious these days.' So the Sperry Gyroscope Co. called into consultation two of the nation's exclusive designers—and the girls themselves.

"The women workers submitted 31 requirements which, to Reginald E. Gillmor, president of the firm and used to dealing with complex government orders, were 'the most interesting specifications I've ever seen.' There should be trousers, of course, 'just long enough to cover and still show our ankles,' creases stitched in, and no trouser pockets because 'they make hips look larger.' Some sort of headdress should keep long bobs out of flying machinery.

"As a result of all this, certain Sperry girls go to work this week coveralled by Vera Marshall and hatted by Lilly Daché. They are testing a bright blue uniform made up in six kinds of material; by request all of the models are of cotton and thus easily laundered by the workers themselves. They will choose the best of these and at the same time adopt a red and blue mesh turban with a typical Daché air. From private customers the milliner gets as much as $500 for an 'exclusive creation' while Miss Maxwell's sportswear also commands fancy prices. The company foots the bill."

DR. MAX BURNELL, Medical Director, AC Spark Plug Division, General Motors Corporation, Flint, Michigan, has this to say:

"It is our opinion here at 'AC' that a specified uniform for women in industry does not allow for individuality and often completely suppresses personality. We ask only that the garment be 'safe,' with no fancy gadgets that might get caught in moving machinery, etc. The accompanying pictures are self-explanatory. They were taken June 18, 1942, long before the article appeared in *Newsweek*. I showed them at the July meeting in St. Louis. These 'uniforms' were ready-made with alterations by the employee to suit her idea of what was attractive; or designed and made entirely by the employee. In the picture of the eight girls, the one on the extreme right was designed and made by this girl at the cost of $1.63."

Industrial Medicine
Reg. U. S. Pat. Off.

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## Re-Examination of Absenteeism

THE statement that employee absenteeism is responsible for the loss of 400,000,000 man-days a year seemed startling when it was new. But since it first appeared about a year ago, it has fallen into evil company. Under the repetitions and exhortations in which it has been made to play a part in connection with nearly every aspect of the worker's personal life, it has grown into propaganda—insidiously useful in the trend toward still more regimentation under the guise of war necessities. The ultimate of this regimentation is suggested in the plan, attributed to "Doctor" McNutt, to require "excuses" for absenteeism — from which it is only a step to picture the employee whistling to get the foreman's attention and holding up two fingers. On the whole, however, the careless uses of the statement and its connotations by some, and the intentional uses *for the purpose of the connotations* by too many others, have built up an implication of reproach to the doctor and suspicion upon the worker.

The term "absenteeism" and the phenomenon of which it has become the generic name should be carefully re-examined. Since the war is now the total business of all employment, this re-examining should be done in the light of the war effort. Whoever desires to make the re-examination may have the job, but if he does it on any basis of fairness and common sense, he will take into account the following considerations:

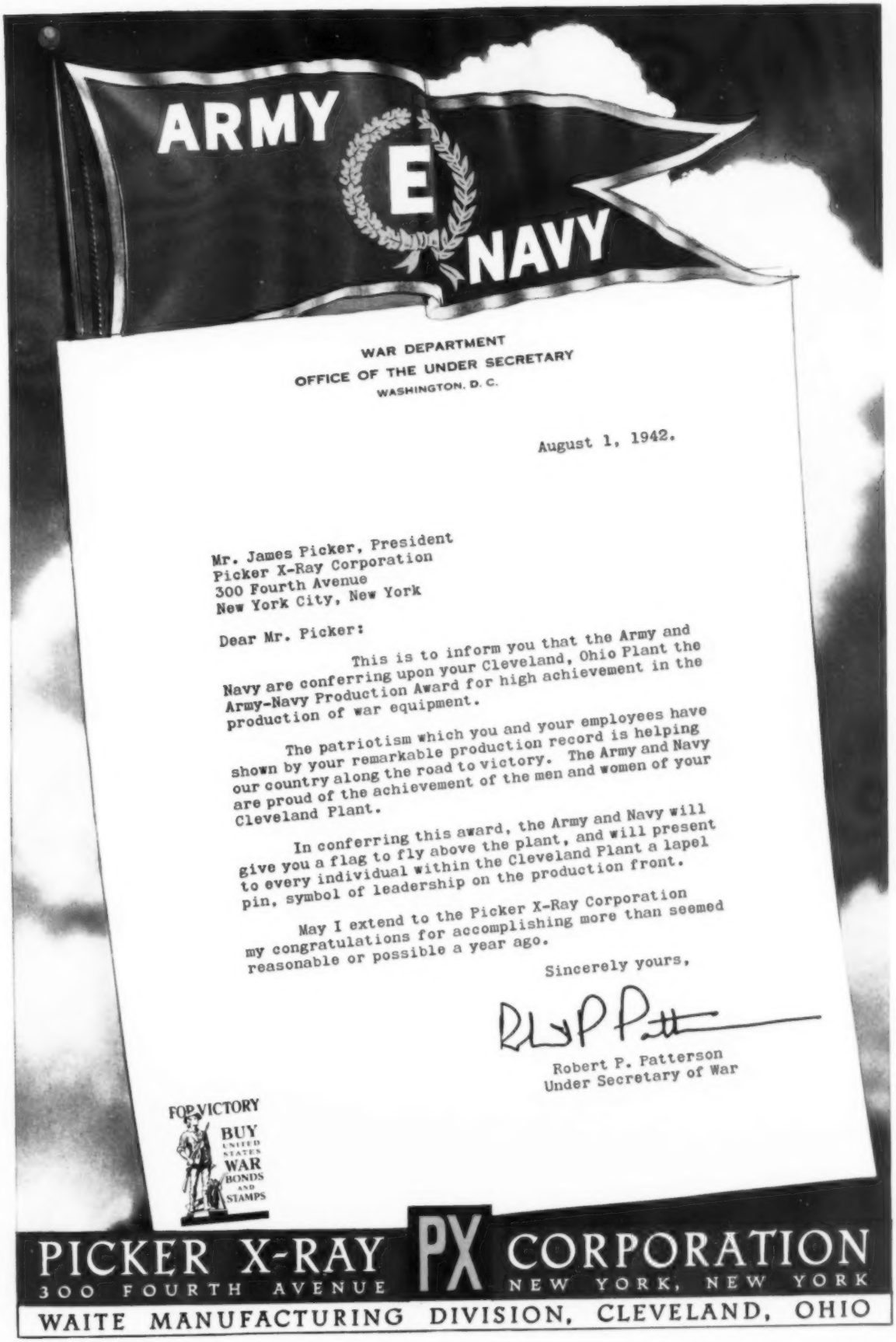
First, a certain amount of absenteeism from work is inevitable. Employees, in general, don't *want* to get sick any more than they *want* to get hurt in accidents. But they do get sick, nevertheless. The National Health Survey estimated the average number of days lost from work or other usual pursuits by reason of specific chronic diseases in 1937 at 697,000,000. Relating this to the 100,000,000 people likely to have "work or other usual pursuits"—even such, perhaps, as going to school—the routine of the entire country in 1937 suffered about 2½% of absenteeism, from chronic ailments. If that is typical of the years since, and if a reasonable estimate for acute conditions is 1½%—not unlikely in view of the recent public polls of the incidence of the common cold—the total is 4% of the habitual effort of the aggregate population inhibited by sickness each year. But the 400,000,000 man days lost by the industrial population of 16,000,000 who are exclusively in war work is only an 8% loss. At best, therefore, about half of the much-deplored absenteeism is attributable to sickness, with probably half of that, or less, in any way preventable. And thus,

Second, not all absenteeism is due to sickness. Some of the other causes—the influences of holidays, events, "economic considerations, specific fiscal arrangements, and the point of view of the community," etc.—were outlined by A. T. Court, of General Motors, in Industrial Medicine for June, 1942. Development of his studies shows still another cause, involved in the continuity of work. With the percentage of absenteeism at X when the work week is five days of 10 hours each, it jumps to X-plus when the work week is seven days of seven hours each. An inevitable amount of absenteeism is inherent in the natural and native common sense of the individual, who knows better than anyone else the pace of his best efforts. "A good worker will take a rest anyhow whether you give it to him or not." The trouble with this factor of the so-called absenteeism total is that the pace-adjusting rest period of the capable worker is not absenteeism in the sense that it should be counted as such. This non-medical phase of the problem is now being further carefully investigated.

Third, it is erroneous to view the absenteeism loss of working time so wholly in terms of munitions, ships, planes, etc., not produced. As a matter of fact, there is no substantial interference with production from this cause. With absenteeism at 8%, production is maintained at 100% by keeping the payroll at 108%. This should be noted in connection with the careless comparisons of the time lost from absenteeism with that lost from strikes—the usual ratio being that the former is 64 times the latter. A strike ties up production; an absenteeism does not. Yet, in spite of solemn promises, the one is sacrosanct, while, in the face of natural causes, the other is a reproach.

THE industrial physicians are working harder than they ever worked before, sincerely and capably doing a magnificent job. They are too busy to pay much attention to things outside their work, even to propaganda. They appreciate as deeply as anyone can the seriousness of absenteeism, and they are doing all that it is possible to do medically to reduce it to the irreducible minimum. It is only fair to them to call attention, specifically, to the fact that so much of absenteeism is beyond their control and, generally, to the fact that the whole subject is being overplayed for reasons which are more political than patriotic.

On behalf of both the doctors and the employees concerned in this problem, it might also be well to note that in terms of the war effort absenteeism has a broad meaning. There is another and much more


ARMY
E
NAVY
WAR DEPARTMENT
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D. C.
August 1, 1942.
Mr. James Picker, President
Picker X-Ray Corporation
300 Fourth Avenue
New York City, New York
Dear Mr. Picker:
This is to inform you that the Army and Navy are conferring upon your Cleveland, Ohio Plant the Army-Navy Production Award for high achievement in the production of war equipment.
The patriotism which you and your employees have shown by your remarkable production record is helping our country along the road to victory. The Army and Navy are proud of the achievement of the men and women of your Cleveland Plant.
In conferring this award, the Army and Navy will give you a flag to fly above the plant, and will present to every individual within the Cleveland Plant a lapel pin, symbol of leadership on the production front.
May I extend to the Picker X-Ray Corporation my congratulations for accomplishing more than seemed reasonable or possible a year ago.
Sincerely yours,
Robert P. Patterson
Under Secretary of War
FOR VICTORY
BUY UNITED STATES WAR BONDS AND STAMPS
PICKER X-RAY PX CORPORATION
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THE ABOVE NAMES ARE LISTED IN THE ORDER OF ENTRY INTO OUR ARMED FORCES

serious kind of absenteeism than that involved in the 400,000,000 man-days referred to. This is the absenteeism of those who, on one pretext or another, are entirely absent from the war work, or are just so far away on the fringes of its periphery as to be safely enough *in* the work to be safely *out* of the war. There are many of these, as will occur to every reader. Most of them are "big enough to fight," and their continuance in absenteeism from the most direct involvement in the war effort of which they are capable is, to say the least, an injustice to every man in uniform, as well as to the thousands who have foregone commissions to serve in places of no glamour. Hundreds of industrial physicians are among the former; more among the latter. It is also an injustice to the workers. Employees in general will stand for an indefinite amount of regimentation so long as they can feel that it will help to win the war. They are not so dumb, however, that they will fail to differentiate between absenteeism *in* the war effort and absenteeism *from* it. Both kinds of absenteeism go deeply into the nature and the resentments of the human being. This is a fact that may have uncomfortable eventualities for those in positions of authority who are playing up the minor implications of the one kind to distract attention from the major implications of the other.

## The State Society Committees

*—on Industrial Health—*

### Indiana

REVIEW of the progress and expansion of the program of this committee during the last three years shows that at present Indiana has one of the most comprehensive programs on industrial health of any state in the nation, and having to her credit several "firsts" in program and accomplishments. This is best illustrated by a nation-wide survey published by the Council on Industrial Health of the American Medical Association which showed Indiana fulfilling 11 out of 12 requirements of the Council, with other states (individual) fulfilling 10, nine and eight, respectively. The only one unfulfilled was that of establishing a Section on Industrial Medicine in our state medical meetings.

### Maine

INDUSTRIAL Health Program conducted by the Special Committee on Industrial Health of the Maine Medical Association, JOSEPH B. DRUMMOND, M.D., Portland, Chairman.

Remarks by CARL H. STEVENS, M.D., Belfast, President of the Maine Medical Association.

"First Aid, Its Rehabilitation in Head Injuries," H. EUGENE MCDONALD, M.D., Portland.

"Communicable Diseases in Industry," ROSCOE L. MITCHELL, M.D., Augusta, Director, State of Maine Department of Health and Welfare.

"First Aid in Injuries," ALLAN WOODCOCK, M.D., Bangor.

"Industrial Nursing," MRS. MERLE R. LORD, R.N., Sanford, President, Maine Branch of Industrial Nurses.

"Occupational Diseases," EDWIN M. FULLER, M.D., Bath.

"Prevention and First Aid Treatment of Eye Injuries," E. EUGENE HOLT, M.D., Portland.

### Massachusetts

FOLLOWING the announcement that called attention to the distribution of the *Manual on Industrial Health for Defense* in the July 30 issue of the *Journal*, the Committee on Industrial Health received several inquiries from physicians seeking openings in industrial medicine. Because the committee had no ready method of meeting these inquiries, on August 17, it voted to "constitute itself as an agency to gather what information it can concerning doctors who may be available for industrial work and also information concerning possible placements for such doctors, working, of course, in close cooperation with the Procurement and Assignment Service and with due regard for other than industrial need for medical service." If this function is to be developed, it will be necessary for the committee to possess certain information concerning physicians who are ready to undertake industrial practice. The committee is therefore preparing a registration form that will be forwarded to any Massachusetts physician who wishes to record himself or herself as a candidate for industrial assignment, as well as to state the conditions under which he or she would be willing to accept such an assignment. The committee may be addressed for this purpose at 8 Fenway.

### Pennsylvania

THE Committee on Industrial Health of our State Medical Society, the Council on Industrial Health of the American Medical Association, and the Bureau of Industrial Hygiene stand ready to assist interested county medical society representatives in attempts to develop interesting programs of instruction. It is respectfully suggested that in making requests for such assistance a copy of the letter making the request be forwarded to the trustee and councilor of the councilor district concerned. Since Pennsylvanians modestly claim the distinction of being citizens of the second largest defense industry state of the Union (including hundreds of new and small plants), it seems not unreasonable to believe that its state medical society enrolling 85% of the practicing physicians of the state should sponsor an active program on industrial health devoted especially to instruction for its members in private practice who may have had but few opportunities to learn anything of the toxicology of many new processes or productions in industry.

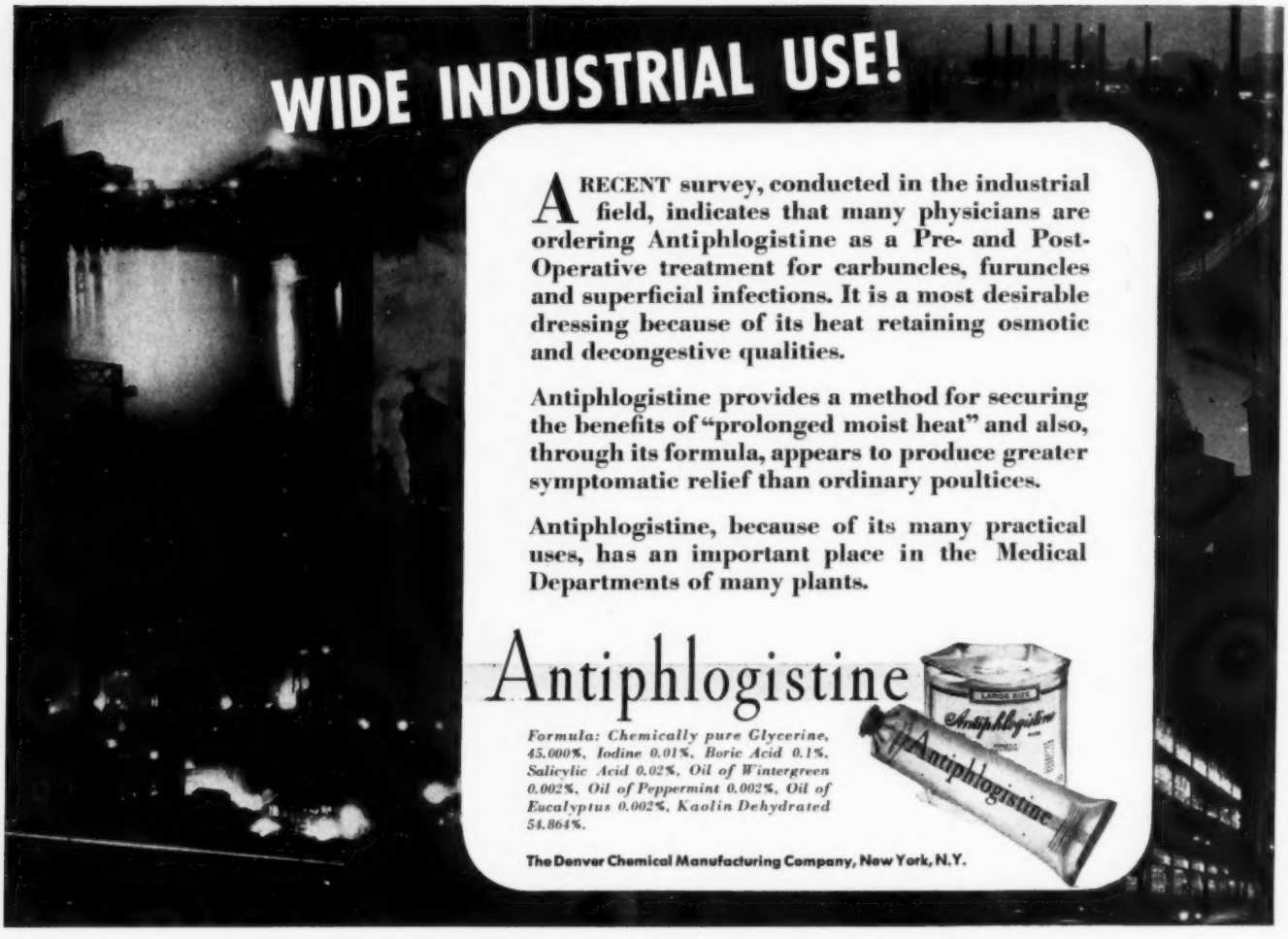
### Virginia

THE committee met in Richmond January 30, 1942. At this meeting it was decided to approach the Department of Clinical and Medical Education of the Medical Society of Virginia to see if that department could not this year emphasize industrial medicine in their programs with the component societies. Fortunately, they had already decided to emphasize industrial medicine and health along with war medicine. As a result of this cooperation, five programs on industrial medicine have been put on in different parts of the state. Such were given at the Clinich Valley Medical Society, the Richmond Academy of Medicine, the Fourth District County Medical Society, and the Northern Neck Medical Society. The latter included considerable war medicine and was given in Richmond. In addition to these medical meetings, your committee helped to arrange for speakers on industrial and war medicine on the program of the Virginia State-wide Safety Conference, there being four speakers on these two subjects. The committee is now endeavoring to have speakers on industrial health on the fall program at the State Health Department which is doing a survey of tuberculosis in industry, using miniature photo-fluoroscopic apparatus.

### Wisconsin

AS A RESULT of the shortage of labor in Wisconsin the State Medical Society was called upon to cooperate in a program which would make it possible for Wisconsin canners to employ 17 year old boys during the canning season. The Committee on Industrial Health developed a physical examination blank designed particularly for this purpose, and, in collaboration with the Wisconsin Canner's Association, appraised all canners in Wisconsin of the program by special bulletin. Before permitting the 17 year old boys to work an unrestricted number of hours during the canning season, the Industrial Commission required that there be on file in the canner's office a statement that the protracted hours of employment would not result in undue hazard to the boys' health. This effort is further evidence of the profession's contribution to the war effort.

Excerpts from the Committee reports as published in the respective state journals.


WIDE INDUSTRIAL USE!
A RECENT survey, conducted in the industrial field, indicates that many physicians are ordering Antiphlogistine as a Pre- and Post-Operative treatment for carbuncles, furuncles and superficial infections. It is a most desirable dressing because of its heat retaining osmotic and decongestive qualities.
Antiphlogistine provides a method for securing the benefits of "prolonged moist heat" and also, through its formula, appears to produce greater symptomatic relief than ordinary poultices.
Antiphlogistine, because of its many practical uses, has an important place in the Medical Departments of many plants.
Antiphlogistine
Formula: Chemically pure Glycerine, 45.000%, Iodine 0.01%, Boric Acid 0.1%, Salicylic Acid 0.02%, Oil of Wintergreen 0.002%, Oil of Peppermint 0.002%, Oil of Eucalyptus 0.002%, Kaolin Dehydrated 54.864%.
The Denver Chemical Manufacturing Company, New York, N.Y.

## Industrial Medicine in Indiana

INDIANA State Medical Association devoted the August, 1942, issue of its *Journal* to industrial medicine, calling that issue the "Wartime Industrial Health Number." Among the several articles, written essentially for the general practitioner, the following high points may be of special interest to the industrial physician and surgeon:

DR. MORRIS FISHBEIN, Editor, *J. A. M. A.*, in "Health in Industry":

One of our first problems is to build industrial medicine to a point which it simply must reach if we are to win the war. Those who are associated with full-time industrial medicine know that it involves many factors. It involves examination of the worker prior to employment, not for the protection of his employer but primarily for the protection of the worker. It involves also a study of the nutrition of the worker and his habits of life, control of his exposure in the plant to gas and flying particles, the guarding of machinery, the protection of the eyes, and the exhaustion of dust and similar materials. It involves some study of the worker's home and of the manner in which the work is carried on in the home, particularly if the worker is a woman who is trying to fill two jobs at the same time. In Great Britain a rule was soon established by the Ministry of Health that makes it compulsory for every industrial plant to have an industrial physician at least part-time. This is recognition of the importance of health in industry.

DR. J. G. TOWNSEND, chief, division of Industrial Hygiene, U. S. Public Health Service, in "Public" Health Officer and Physician Must Work Together":

The personal physician, for his part, can sharpen the tools at his command. He can make the use of accurate and detailed occupational histories standard practice. He can use the pre-employment examination as a pre-*placement* method. He can increase his familiarity with occupational diseases, their causes and control, and give the reporting of such illness the same care he gives communicable disease.

The physician who efficiently handles a case of occupational disability saves a working skill as well as a man. Such medical efficiency and such rescued skills, together, multiplied by thousands each month and transformed into astronomical numbers of war weapons, demonstrate that the private medical practice can be as much a part of front-line combat as accurate artillery.

DR. EDWARD C. HOLMBLAD, Managing Director, American Association of Industrial Physicians and Surgeons, in "Thoughts About Problems of Wartime Medicine":

One of the first things we must do is to get competent and adequate secretarial help to take over the "paper work." I talked with the chief medical officer of a large war industry this past week who operates, supervises treatment, and examines patients from 8:00 A. M. to 6:00 P. M. Then from 6:00 P. M. to midnight he does his desk and paper work. Isn't it too bad that some way hasn't been devised to relieve him of this detail? We must help him to get adequate help and relief from this extra burden. . . . In many industries and business or plant medical departments nurses and trained assistants can remove dressings and re-apply bandages and dressings under medical supervision. In this same war industry I was glad to see that every dressing case was looked at or examined by a physician before others carried out the detail of treatment. . . . One outstanding orthopedic specialist in our city has his secretary tell each patient on going in to see the doctor that the interview is limited to 10 minutes. This frequently saves unnecessary conversation and gets

the essential work done promptly. . . . War medicine demands that medical service will have to be streamlined in many respects. We may learn to accomplish great things and demonstrate short cuts we never dreamed possible. We must realize that our services have to be speeded up; that if only half the doctors are to be available at home, both the patient and doctor must cooperate to make that service the best, and that it must be limited to the essentials in this war effort.

DR. CARL M. PETERSON, Secretary, A. M. A. Council on Industrial Health, in "Industrial Health in Wartime":

1. We must conserve the few well-trained industrial physicians, hygienists, nurses and others and use them not alone in their present professional capacities but as a nucleus for training others. This concept apparently is receiving much more realistic consideration in official agencies having to do with the conservation and proper use of medical and other professional manpower.
2. We must convince small and medium-sized plant operators that it is desirable in every way to support programs of industrial health. In this direction we can expect powerful assistance from influential agencies in the government, in industry itself, and from labor.
3. We must persuade and educate the employee to take a greater interest in his own physical welfare off the job as well as on it. We must recognize that employees spend more time away from work than on the job and that in a great many instances the working environment is actually more favorable to health than co-existing bad housing, poor nutrition and improper use of leisure time.

LIEUTENANT-COLONEL A. J. LANZA, Medical Corps, in "Industrial Activities of the Surgeon General's Office":

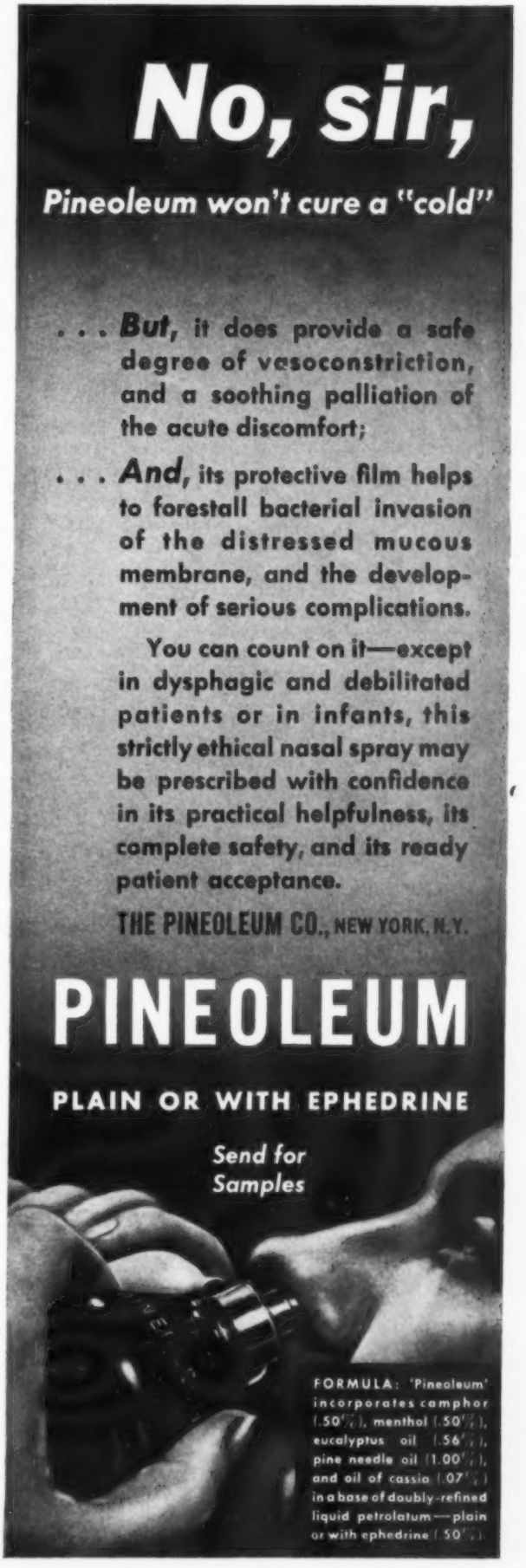
The War Department is at the present time operating more than 150 industrial plants, depots, air bases and repair shops, employing approximately 400,000 civilian industrial workers who are Civil Service employees. These enterprises cover a wide range of manufacturing, fabricating and repairing. The relationship of the War Department to these employees is similar to that of any comparable private employer. Responsibility for healthful working conditions, for adequate first-aid service and industrial medical service, for a program of pre-employment and periodic physical examinations, for supervision and control of occupational health hazards, and for industrial hygiene surveys has been assigned to The Office of The Surgeon General of the Army. In the Preventive Medicine Service of The Surgeon General's Office, there has been set up a Division of Occupational Hygiene to fulfill these functions; the Division includes an industrial hygiene laboratory located at the Army Medical School.

The general scope of industrial medical service in these Army-operated plants is similar to that which is found throughout industry and it is the aim of the War Department to provide first-class working conditions, competent physicians and nurses and an adequate health program for its civilian employees so as to insure the most favorable conditions for maximum production.

DR. N. K. FORSTER, Hammond, Indiana, in "Problems in Wartime Industrial Practice":

I would like to take this opportunity to invite those responsible for the health of the industrial worker to call upon their State Chairmen for Physicians for the names of those willing to serve the industrial population. It is the sincere hope of this office that arrangements will be made between the employing organization and those prepared to serve in this important endeavor with minimum effort.

Each state has been assigned a quota of the physicians to meet the needs of the armed forces. As the quota is met, the War Department withdraws its recruiting boards and the state chairmen are advised to certify as available only those under 37 of the rural areas in excess of one doctor per 1,500 population or in the urban areas where men of this age-group are logically spared. In this manner, the physicians remaining in each state are asked to make



No, sir,
Pineoleum won't cure a "cold"
. . . But, it does provide a safe degree of vasoconstriction, and a soothing palliation of the acute discomfort;
. . . And, its protective film helps to forestall bacterial invasion of the distressed mucous membrane, and the development of serious complications.
You can count on it—except in dysphagic and debilitated patients or in infants, this strictly ethical nasal spray may be prescribed with confidence in its practical helpfulness, its complete safety, and its ready patient acceptance.
THE PINEOLEUM CO., NEW YORK, N.Y.
PINEOLEUM
PLAIN OR WITH EPHEDRINE
Send for Samples
FORMULA: 'Pineoleum' incorporates camphor (.50%), menthol (.50%), eucalyptus oil (.56%), pine needle oil (1.00%), and oil of cassia (.07%) in a base of doubly-refined liquid petrolatum—plain or with ephedrine (.50%).

every effort to facilitate the redistribution of physicians within the state border to satisfy the needs of industry. Those above military age, or if under 45 those who have been rejected for military service, should participate in an essential capacity. There is no more important position in civil life than the meeting of the health needs of the industrial worker and his dependents.

## October Meetings

TWO meetings start off the fall activities, presenting subjects of great importance to industrial physicians and surgeons, industrial hygienists and safety supervisors These are the Seventy-first Annual Meeting of the American Public Health Association, at St. Louis, October 26-30, and the Thirty-first National Safety Congress and Exposition at Chicago, October 27, 28 and 29.

The sessions of the American Public Health Association which are of particular interest are those of the Industrial Hygiene Section, beginning Monday, October 26, with a Symposium on Occupational Diseases at which the subject "Sickness Proneness Among Industrial Workers," will be presented by DR. W. M. GAFAFER, and other speakers.

Tuesday, October 27, finds the Industrial Hygiene Section giving a Symposium on Industrial Hygiene and War, with the following papers: "The Industrial Hygiene Program of the Army Medical Corps," by LT. COL. A. J. LANZA, M. C.; "The Program of the United States Navy," by CAPT. C. S. STEPHENSON, U. S. N.; "The Program of the U. S. Public Health Service," by JAMES G. TOWNSEND, M. D. (Medical Director, U. S. Public Health Service); and "Unexpected Occupational Disease Exposures During Wartime," by JOHN J. PRENDERGAST, M.D., Chrysler Motors.

On Wednesday morning, October 28, there will be presented a Symposium on Training of Industrial Hygiene Personnel, with papers as follows: "The Training of the Physician," by DR. CARL M. PETERSON, Secretary, A. M. A. Council on Industrial Health; "The Training of the Hygienist," by PROF. THEODORE F. HATCH, late of the University of Pennsylvania and now in the Army service; and "Undergraduate Training," by MILTON H. KRONENBERG, M. D., Chief, Bureau of Industrial Hygiene, Illinois State Department of Health, Chicago.

On Wednesday, October 28, a special luncheon session of the Industrial Hygiene Section will feature an address by a representative of Great Britain, and reports of committees as follows: on Skin Irritants, DR. LOUIS SCHWARTZ; on Ventilation and Atmospheric Pollution, DR. EMERY R. HAYHURST; on Standard Methods for the Examination of Air, DR. EMERY R. HAYHURST; on Lead Poisoning, DR. ROBERT A. KEHOE; on Pneumoconiosis, DR. R. R. SAYERS; on Industrial Anthrax, DR. HENRY FIELD SMYTH; and on Volatile Solvents, DR. HENRY FIELD SMYTH, JR.

Thursday morning, October 29, there will be presented a Symposium on Chemical and Engineering Methods in Industrial Hygiene, with the following papers: "Newer Problems in Industrial Ventilation," by W. C. L. HEMEON; "A Critical Study of the Phenyldisulfonic Acid Method for the Determination of the Oxides of Nitrogen," speaker to be announced; "The Determination of Halogenated Hydrocarbons," by DR. FREDERICK H. GOLDMAN; "The Collection, Determination, and Identification of Solvent Vapors," by DR. WILLIAM G. FREDRICK; and "A Practical Housekeeping Program for Industry," by HERBERT G. DYKTOR.

At the Thursday afternoon meeting of the Industrial Hygiene Section the following papers will be presented: "Acute Toxicity of Ethylene Glycol Ethers," by DR. HAROLD W. WERNER; "Physiological Response to Magnesium Dust," by DR. LEROY U. GARDNER; "Monomeric Styrene," by DR. DON D. IRISH; and "Eye Hazards in Industry and Their Control—An Industrial Health Problem."

The Industrial Hygiene Section meetings will close on Friday morning, October 30, with a joint meeting of the Industrial Hygiene and Food and Nutrition Sections, with the following papers: "Food and Nutrition of the Industrial Worker in Wartime," by DR. FRANK G. BOUDREAU; "Teaching Nutrition to the Families of Industrial Workers," by EVELYN HOLLEN; "The Functions of Nurses in Industry," by OLIVE M. WHITLOCK, R. N.; and "Improved Dental Health for Workers," by DR. LYMAN D. HEACOCK.

THE sessions of the Thirty-first National Safety Congress on October 27, 28 and 29, at Chicago, contain subjects of importance on industrial nursing, industrial health, and occupational diseases in munitions manufacturing, as well as a session on dusts, fumes, gases, vapors.

The first session, on industrial nursing, occurs Wednesday afternoon, October 28, at the LaSalle Hotel, with JOANNA M. JOHNSON, R. N., presiding, and the following papers to be presented: "Selling Your Program to Management, Supervisors and Workers," by MRS. MARION C. BRITTINGHAM, R. N., The Cuneo Eastern Press, Inc., Philadelphia; "What the Industrial Nurse Needs to Know About Hand and Foot Injuries," by DR. FREDERICK W. SLOBE, Chicago; and "What the Industrial Nurse Can Do About Tuberculosis," by DR. FLORENCE MCINNIS, Department of Public Health, Milwaukee.

The Thursday Industrial Nursing Luncheon Session, at which MRS. CHRISTIAN SEABROOK, R. N., Metropolitan Life, Chicago, will preside, will feature the address of DR. MEYER BROWN, of Chicago, on "Mental Health of Workers."

The Thursday afternoon session, October 29, of the Industrial Nursing group, at which also MRS. CHRISTIAN SEABROOK will preside, will present a Round Table on Current Problems of Industrial Health Departments, with DR. M. H. KRONENBERG as discussion leader.

The session on Industrial Health on Thursday morning, at which DR. LEONARD GREENBURG, Executive Director of the Division of Industrial Hygiene, New York State Department of Labor, New York City, will preside, has the following papers: "Industrial Rehabilitation of Permanently Injured Workers," by DR. EDWARD C.. HOLMBLAD, Chicago; "Strains and Hernia," by DR. HARVEY BARTLE, Chief Medical Examiner, Pennsylvania Railroad Company, Philadelphia; and "Safe Use of Substitute Solvents and Chemicals," by DR. J. H. STERNER, Director, Laboratory of Industrial Medicine, Eastman Kodak Co., Rochester.

Also on Thursday morning, with DR. CARL M. PETERSON, of the A.M.A. Council on Industrial Health, presiding, there will be presented the subject of Occupational Diseases in Munitions Manufacture, in the following papers: "Dermatitis Problems—Prevention and Treatment," by DR. LOUIS SCHWARTZ, Medical Director, U. S. Public Health Service, National Institute of Health, Bethesda, Maryland; and "Other Occupational Disease Factors," by DR. LEMUEL C. MCGEE, Medical Director, Hercules Powder Co., Inc., Wilmington, Delaware.

On Wednesday morning, October 28, a program on the general subject of Dusts, Fumes, Gases and Vapors will be presented, with DR. STUART F. MEEK, Assistant Medical Director, Chrysler Corporation, Detroit, presiding, and the following papers: "Fundamentals of Ventilation and Exhaust of Dusty Processes," by JOHN M. KANE, Engineer, American Air Filter Co., Louisville, Kentucky; "Testing Toxic Atmospheres," by N. R. BERNZ, Chief Industrial Hygienist, The Fidelity & Casualty Co., New York; and "Demonstration and Discussion of Various Respiratory Protective Equipment," by DR. H. H. SCHRENK, Chief Chemist, Health Division, U. S. Bureau of Mines, Pittsburgh.

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## INDUSTRIAL HEALTH and DISEASE

### Essential Physicians in Industrial Medicine

*— Criteria for Determination —*

THE situation regarding recruitment of physicians now employed in industrial medicine has caused the directing board of the Procurement and Assignment Service to send the following memorandum to all state chairmen relative to the methods by which the essentiality of physicians engaged in industrial medicine may be determined:

A serious situation is developing in some states because physicians under 45 years of age who are essential in their present positions as key men in industrial practice are being declared available by state chairmen or are being approached directly by recruiting boards with instructions to apply for a commission in the Army Medical Corps.

The Selective Service System and the Surgeon Generals of the Army and of the Navy are cooperating with us to keep at their posts the physicians declared to be essential by our state committees. In determining essentiality, please be guided by the following criteria, which have been recommended by the Committee on Industrial Health and Medicine and have been approved by the directing board.

In some instances an industrial physician under 37 years of age will be deemed essential according to these criteria, and yet you may think he should be made available. In this case it is your responsibility to obtain a replacement and to notify the central office at once when the industrial physician will be available.

A physician employed in industry is deemed to be essential when the following conditions exist:

A. Full time industrial physician.

1. The physician is employed by an industry which is manufacturing war materials exclusively or under priority ratings, and

2. The physician gives his full time to the industry or 40 or more hours weekly, has been so employed for at least two years, or is especially trained for that purpose and is carrying on an acceptable health maintenance program, and

3. The physician is performing the function of a medical director or department head or of a specialist or is the only physician employed.

4. Assistant physicians who perform routine functions under direction and are employed on a full time basis are deemed essential until they can be replaced within a reasonable time (three to six months).

B. Part time industrial physician.

1. The physician serves part time two or more industries engaged exclusively in the manufacture of war materials or under priority ratings, provided his total part time service is the equivalent of 40 or more hours weekly. (Note: The physician who serves on call only is not deemed to be essential.)

C. The physician serves a state industrial hygiene bureau full time.

*J. A. M. A.*, September 5, 1942.

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### Standards for Maternity Care and Employment of Mothers in Industry

WITH increased employment of women in industry, the problem of protection of the pregnant woman and her child has become more urgent. Many inquiries have come to the Women's Bureau and to the Children's Bureau from a variety of sources, such as employers, workers, and health departments, concerning the types of work suitable for pregnant women and the policy of maternity leave. The labor situation in this country does not necessitate the recruitment or employment of pregnant women or women with infants. A woman who is expecting a child should give first consideration to her own health and to plans for safeguarding the health and care of the child. Because some women who are pregnant or who have young children may find it necessary to work, the following statement of policy has been formulated to serve as a working basis for those concerned with this problem. It is recognized as a general policy that provisions for maternity care and leave should not jeopardize the woman's job nor seniority privileges.

#### Employment Policies and Care

THESE recommendations are based on the premise that to safeguard the pregnant woman who works certain special provisions should be made. She should have opportunity for adequate prenatal care. She needs sufficient time off before delivery to allow her to be in a rested state at the time of delivery and to prevent undue strain in the latter part of pregnancy. If she is employed in certain occupations that involve hazards or strain, or if complications of pregnancy occur, she needs special consideration. It is not possible to lay down hard and fast rules that will fit every situation. The wide variation in general physical condition and in the amount of home duties performed outside working hours necessitate some individualization of arrangements for maternity leave and protection.

The following general recommendations are made as a guide:

1. Facilities for adequate prenatal medical care should be readily available for all employed pregnant women; and arrangements should be made by those responsible for providing prenatal care, so that every woman would have access to such care. Local health departments should make available to industrial plants the services of prenatal clinics; and the personnel management or physicians and nurses within the plant should make available to employees information about the importance of such services and where they can be obtained.

Prepared by the Children's Bureau and the Women's Bureau of the U. S. Department of Labor, in consultation with:

MRS. DOROTHY J. BELLANCA, Amalgamated Clothing Workers of America, New York.

MISS ELIZABETH NORD, Textile Workers Union of America, Providence, Rhode Island.

MISS ROSE SCHNEIDERMAN, New York State Department of Labor, New York.

DR. H. CLOSE HESSELTINE, Department of Obstetrics and Gynecology, School of Medicine, University of Chicago.

DR. N. J. EASTMAN, Department of Obstetrics, Johns Hopkins University School of Medicine, Baltimore.

DR. JAMES G. TOWNSEND, Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland.

MISS ELEANOR RANTOUL, Industrial Hygiene Bureau, Metropolitan Life Insurance Company, New York.

2. Pregnant women should not be employed on a shift including the hours between 12:00 midnight and 6:00 A.M. Pregnant women should not be employed more than eight hours a day nor more than 48 hours per week, and it is desirable that their hours of work be limited to not more than 40 hours per week.

3. Every woman, especially a pregnant woman, should have at least two 10-minute rest periods during her work shift, for which adequate facilities for resting and an opportunity for securing nourishing food should be provided.

4. It is not considered desirable for pregnant women to be employed in the following types of occupation, and they should, if possible, be transferred to lighter and more sedentary work.

(a) Occupations that involve heavy lifting or other heavy work.

(b) Occupations involving continuous standing and moving about.

5. Pregnant women should not be employed in the following types of work during any period of pregnancy, but should be transferred to less hazardous types of work.

(a) Occupations that require a good sense of bodily balance, such as work performed on scaffolds or stepladders and occupations in which the accident risk is characterized by accidents causing severe injury, such as operation of punch presses, power-driven woodworking machines, or other machines having a point-of-operation hazard.

(b) Occupations involving exposure to toxic substances considered to be extra hazardous during pregnancy, such as:

Aniline.
Benzol and tuluol.
Carbon disulphide.
Carbon monoxide.
Chlorinated hydrocarbons.
Lead and its compounds.
Mercury and its compounds.
Nitrobenzol and other nitro compounds of benzol and its homologs.
Phosphorus.
Radioactive substances and x-rays.
Turpentine.

Other toxic substances that exert an injurious effect upon the blood forming organs, the liver, or the kidneys.

Because these substances may exert a harmful influence upon the course of pregnancy, may lead to its premature termination, or may injure the fetus, the maintenance of air concentrations within the so-called "maximum permissible limits" of state codes, is not, in itself, sufficient assurance of a safe working condition for the pregnant woman. Pregnant women should be transferred from workrooms in which any of these substances are used or produced in any significant quantity.

6. A minimum of six weeks' leave *before* delivery should be granted, on presentation of a medical certificate of the expected date of confinement.

7. At any time during pregnancy a woman should be granted a reasonable amount of additional leave on presentation of a certificate from the attending physician to the effect that complications of pregnancy have made continuing employment prejudicial to her health or that of the child.

### After Delivery

TO SAFEGUARD the mother's health she should be granted sufficient time off after delivery to return to normal and to regain her strength. The infant needs her care, especially during the first year of life. If it is essential that she return to work, the following recommendations are made:

1. All women should be granted an extension of at least two months' leave of absence after delivery.

2. Should complications of delivery or of the postpartum period develop, a woman should be granted a reasonable amount of additional leave beyond two months following delivery, on presentation of a certificate to this effect from the attending physician.

## A.M.A. Council on Industrial Health

THE tenth meeting of the Council on Industrial Health was held at the Hotel Traymore in Atlantic City, June 7, 1942. Those present included STANLEY J. SEEGER, Chairman; HARVEY BARTLE, LEVERETT D. BRISTOL, WARREN F. DRAPER, PHILIP DRINKER, LEROY U. GARDNER, RAYMOND HUSSEY, ANTHONY J. LANZA, ROBERT T. LEGGE, CLARENCE D. SELBY, WILLIAM D. STROUD and CARL M. PETERSON, Secretary.

### Professional Relations

STEPS taken to develop and maintain interest in industrial health in state, county and special medical societies were reviewed by the Committee on Professional Relations. Additional discussion demonstrated that contact with state committee personnel, officers of state medical societies and other influential people was more important now than ever before and that effort should be made to augment this activity if possible. It was recommended that additional assistance should be secured if agreeable to the Board of Trustees.

The association of the chairman of the Council as consultant to the Division of Industrial Hygiene, U. S. Public Health Service, was described in expectation that this type of organization would stimulate medical society cooperation and activity as well as improve associations between physicians and the personnel and programs of industrial hygiene bureaus in state health departments.

The growing interest in industrial health by the sections of the Scientific Assembly was viewed with great favor. Several of these cooperating committees have regarded some of their problems as common to all specialties, and it seems likely that a method of group consideration and subsequent recommendation to the Council could be adopted.

### Education and Publications

THE Committee on Education and Publications emphasized particularly the urgency of postgraduate instruction. It was realized that, in making plans for such training, full account would need to be taken of the shrinking medical population and the enormous additional burden thrust on physicians in community practice.

Plans for better training of health officers in the essentials of industrial hygiene were described as an additional approach to adequate handling of certain medical requirements in industry and as a means of acquainting the general profession in better fashion about acceptable industrial health methods.

The Council noted that DR. C. D. SELBY had been added to the joint committee to investigate certification of industrial practitioners as a representative of the American Association of Industrial Physicians and Surgeons. The difficulties attached to such a program were discussed.

The Committee on Occupational Dermatoses of the Section on Dermatology and Syphilology will be asked to review the necessity for a concentrated drive on dermatitis in industry as a direct contribution to reducing lost time in industry and to prepare useful educational material for the publications program of the Council.

### Physical Examinations

THE Committee on Physical Examinations presented a tentative outline intended to conform as closely as possible to the American Medical Association manual on Periodic Health Examinations. After extensive and critical review it was agreed that the committee present a revised draft to the Council.

### Occupational Disease Reporting

THE same difficulties previously reported about securing accurate information relative to occupational disease incidence continue to operate. A number of recommendations for continued activity and greater improvement of reporting included:

(*a*) Better collaboration between health departments and industrial commissions.

(*b*) Improved financial support for the preparation of statistical studies by workmen's compensation authorities.

(*c*) Better cooperation from physicians in reporting occupational diseases.

Attention was called to an improved form for tabulating compensable conditions developed by the U. S. Department of Labor. It was also suggested that the Council and other interested agencies begin to urge on the Bureau of the Census that a tabulation of deaths by occupation be made available as soon as possible.

### Workmen's Compensation

THE Committee on Workmen's Compensation reported that conferences had been held recently with insurance executives to discuss medico-insurance relations, such as super-

vision of medical service, organization of medical departments in insurance companies, medical field work and the procurement of physicians to undertake insurance and compensation practice in various localities. These conferences made it clear that further contact is necessary if an effective medico-insurance program is to be developed. Representatives of stock and mutual casualty insurance companies meet regularly for the discussion of rates and claims. In this joint conference there is a subcommittee on medicine. It is hoped that working relations can be established with this committee after additional informal discussions have occurred with top executives.

The committee has also held conferences with representatives of the Bureau of Labor Standards in the U. S. Department of Labor and with executive officers of organized labor groups in Maryland. As far as can be readily determined, labor has made few attempts to formulate a definite health and medical program.

In spite of many surveys made on the operation of workmen's compensation laws, few pertinent medical data are available. It is not only desirable but highly important that such data be obtained. It is particularly true in those states where medical boards have been appointed in connection with the administration of occupational disease laws. The committee emphasized the need for acquainting state medical societies with the medical aspects of compensation legislation, since it is highly probable that these laws will be revised or expanded in many directions shortly. In the same way, a genuine effort should also be made to have properly qualified physicians hear testimony on controverted medical issues. Medical boards attached to compensation commissions appear to be an effective solution, and thought should be given to methods of organization and personnel of such boards. Medical societies also should be encouraged to study medical testimony in courts of law and quasi-judicial administrative bodies with a view toward establishing methods of investigating questionable medical evidence. They should also be stimulated to maintain contact with industrial commissions through appropriate committees. The committee called attention again to the controversy in occupational disease legislation between schedule versus general coverage types of laws. It is desirable that the Council develop and express an opinion on this subject from a purely medical point of view.

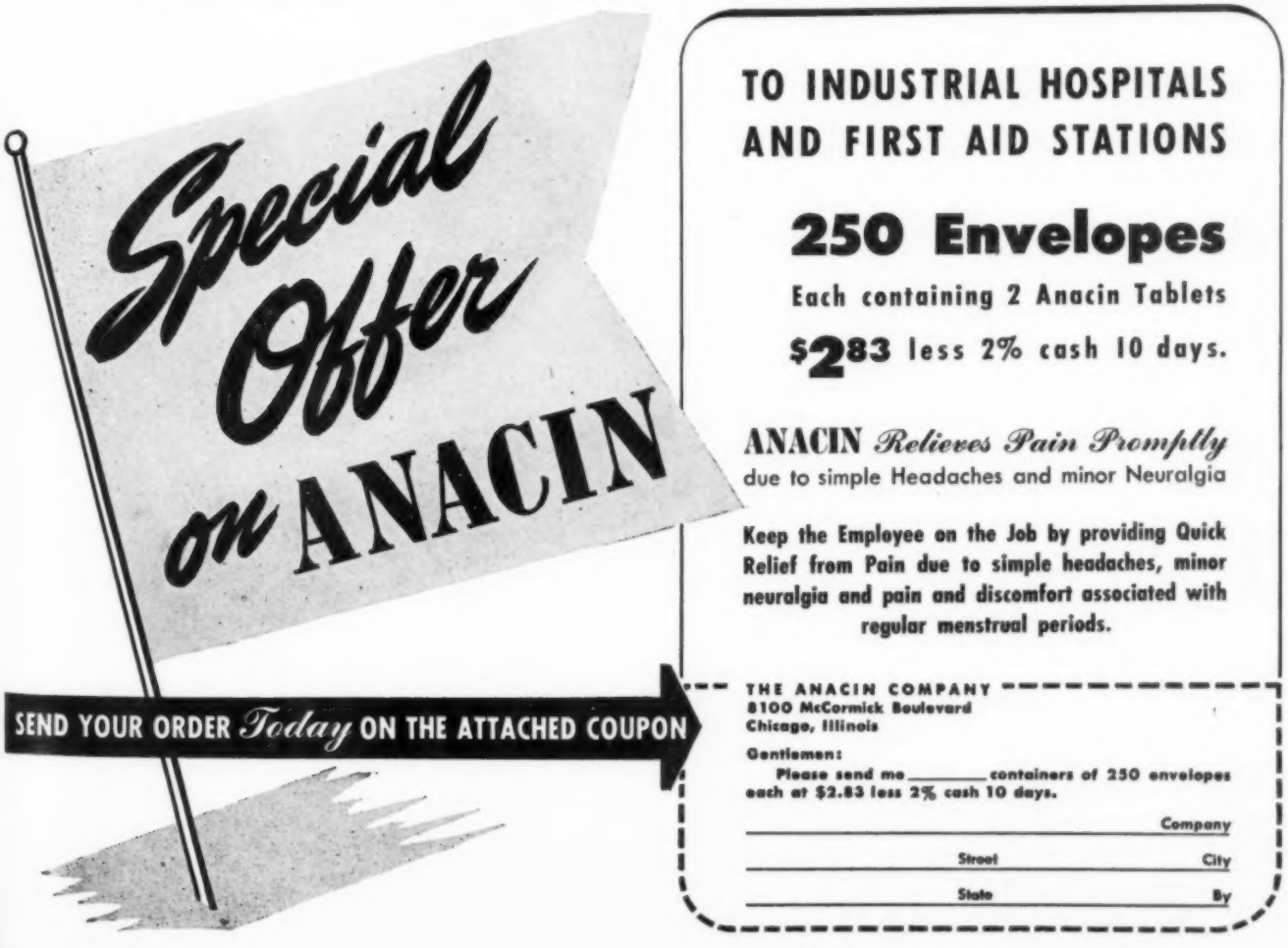
In recognition of the fundamental importance of the report, the Council agreed that the committee be enlarged through the appointment of additional members and by the creation of advisory personnel representative of law, insurance, labor and other affected interests. The relation of this committee to other agencies in the American Medical Association, particularly the Bureau of Legal Medicine and Legislation and the Bureau of Medical Economics, should be clarified as well as with such other medical organizations as the National Tuberculosis Association, the American Heart Association and others as found desirable. The Council instructed the committee also to call the attention of the state medical societies to the need for a review of methods to control medical testimony and to engage at once in the preparation of articles on prevailing medical opinion about industrial disability.

### Research

THE Committee on Research was instructed to investigate those aspects of industrial medical experience most urgently in need of review and to develop recommendations calculated to encourage specific studies. Programs of the committees on industrial health in the sections of the Scientific Assembly in particular were thought to hold great promise if pursued in this direction. Particular attention also should be given to problems of industrial health administration and the rehabilitation and utilization in industry of handicapped persons.

### Industrial Health and the War

THE Council heard reports presented by the Subcommittee on Industrial Health and Medicine, the Division of Industrial Hygiene in the National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Institute of Health, the Industrial Hygiene Division of the Medical Corps of the U. S. Army, and the Procurement and Assignment Service. These reports confirmed the impression that the medical profession is increasingly aware of the importance of industrial health but that there are great and unsolved problems still to be met before physicians find themselves in good position to respond to greatly increased demands for industrial medical service.

### Industrial Nursing

THE representative of the Council on the Committee to Study the Duties of Nurses in Industry of the American Public Health Association reported that this survey was still in progress. The Council also reviewed a request for the publication of a pamphlet for the guidance of industrial nurses along lines previously followed by the State Medical Society of Wisconsin.

### Nutrition in Industry

A JOINT committee representing the Council on Foods and Nutrition and the Council on Industrial Health was organized to consider scientific problems arising in the field of nutrition in industry, to study available evidence and to bring to the attention of the profession at large prevailing opinion on adequate nutrition of industrial employees. Members appointed on this committee were:

Representing the Council on Foods and Nutrition, JAMES S. MC LESTER, GEORGE R. COWGILL and RUSSELL M. WILDER.

Representing the Council on Industrial Health, LEVERETT D. BRISTOL, CLARENCE D. SELBY and WILLIAM D. STROUD.

### Industrial Medical Service Plans

ATTENTION was paid to types of medical organization available to industrial workers and their families in ordinary as well as boom areas, and with special reference to those medical service plans now being developed by state and county medical societies and by labor unions. Subsequent studies will determine to what extent these and other experiments are meeting the existing demands for redistributing available medical personnel and facilities.

### Civilian Defense

THE Council recommended that the Office of Civilian Defense be asked to issue a manual of instructions for physicians in industry and that specific plans of individual industrial organizations for medical management of catastrophes be given publicity if of sufficient merit.

### Women in Industry

THE formation of a subcommittee on the Health of Women in Industry was discussed. It was also agreed that women physicians could play a very useful role in industrial medical organization.

### Aviation Medicine

THE Council created a committee to consider the advisability of a program in aviation medicine for application to ordinary industrial, test flight and transportation problems as opposed to purely military aspects, and having in mind the establishment of proper relationships with the activities now occurring in the National Research Council along the same lines.

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## The Neurotic Personality

W. W. YOUNG, M.D.,
*Associate Professor of Psychiatry and Neurology, and Chairman of the Department, Emory University*

THE term, neurotic, must be considered relative. Many so-called "normal" reactions have neurotic components and the reactions of the neurotic are often "normal." After all, in the last analysis, the difference between health and illness lies in this, that the healthy individual is thinking in terms of what he is doing to life, and the ill in terms of what life is doing to him. The difference between the "normal" and neurotic reaction is not a difference in kind or quality but a quantitative difference, one of degree; and the reaction is in terms of "something wrong." Thus there are two components: degree or quantity of reaction, and attitude thereto. Two men make a rapid descent of 12 floors in an elevator. When they reach the bottom the pulse rate of both is accelerated. One goes on about his business; the other stops, feels his pulse and rushes off to the doctor. A man during an air-raid "goes all to pieces." He shakes; his heart palpitates; he may vomit or even have acute diarrhea. The "all clear" sounds; he shakes himself together and goes on with his work. This reaction is considered a part of air-raid experience. Let this man have the same reaction while sitting at his desk working and he thinks in terms of "what's wrong" and runs to the doctor.

Before consideration of the reasons for these differences, let us discuss somewhat the average, daily reactivities of the average person. All are born in insecurity and live through life with varying degrees. Urged by this, man tries to accomplish and satisfy. In these efforts he will meet with many frustrations due to social conditions, his own inherent limitations in qualities and qualifications and vicissitudes of fortune. Now every frustration brings a reflex reaction of anger, anything from irritation to rage and, as a result, feelings of hostility. Most of the time these hostility feelings are worked off in harder work or in the activities of tennis or golf.

Often, however, these hostility feelings are directed at someone or something. Often the reaction of anger gets out of bounds and resulting action becomes ill-advised. Then comes the reaction of guilt which always calls for some form of atonement. Man has worked out ways and means of satisfactory atonement which lie more or less in the realm of action. The most constructive is "living it down." Then there is apology, correcting mistakes and indirectly by doing something "sacrificial" for someone else. Thus the average man in his daily routine in the great experiment of life, strives for elusive security; meets frustrations; gains outlet for hostilities and atones by action for his guilt. He remains in a relative state of health.

Why the excess reactivity in some people? There is lacking an essential degree of security feelings resulting in undue feelings of insecurity. The reasons for this are too numerous for the scope of this paper. In general, however, there is the constitutional element of hypersensitiveness with native hyperreactivity. Then in the growing up period the deficit or lack of factors promoting feelings of security. The most important of these is a "feeling of belonging." Insecurity is enhanced by broken homes, homes of strife, rejection by parents and all these elements which make the child feel not-wanted. Therefore, it is undue feelings of insecurity which bring about the over-reactivity.

In proportion to one's insecurity so is the strength of the drive for security. Consequently, some must always know the answer; must always be right and always succeed; and must possess completely. These goals symbolize security. Out of these strivings grow what might be called a "perfectionistic" attitude. They expect perfection in everything and too much of themselves and everyone else. Since these goals are impossible and apply to even the most trivial aspects of life, such persons are constantly faced with failure (ambition out of proportion to accomplishment). Each failure brings greater feelings of insecurity and there is created a vicious circle. This mounting insecurity gives rise to greater and greater self-consciousness with its tendency to think in terms of "what is happening to me." There is a consequent tendency for the perfectionism to assume the attitude of "what's wrong with me." Thus most of the reactivities released by the average person in outward action, in these persons is turned inward.

The perfectionistic drive toward impossible goals brings hourly and daily frustrations. Thus this person accumulates a tremendous load of hostility feelings, and, since he expects so much of himself, he is most frustrating to himself. This is often the source of suicidal gestures. The rising tide of tension resulting from these accumulating hostilities over and over are released in ill-advised action. In such a person the least digression from perfection either in thought or action brings tremendous feelings of guilt. And in all of this the release tends to be self-directed so that self-punishment is a common type of

Read before the Medical Association of Georgia, Augusta, April 29, 1942; published in the *Journal of the Medical Association of Georgia*, August, 1942.

reaction. Often the direction of the reaction is doubly motivated; accomplishes an expression of hostility with self-punishment. This may be summed up in the phrase used by the little boy, "Nobody loves me. I'm going in the garden and eat worms." He thus punished those who do not love him and at the same time himself for the guilt resulting from feeling this way toward them.

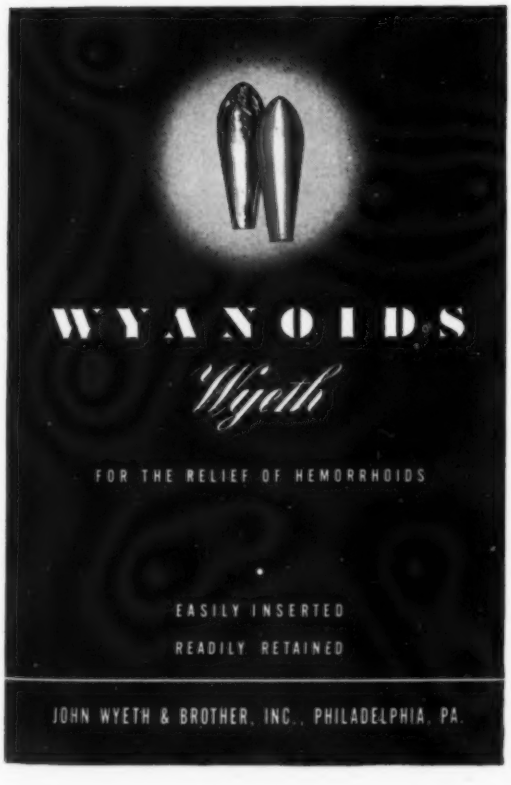
Thus the symptomatology of the neurotic is not of fundamental importance but points back to the elements making up this type of personality and in this lie the points for consideration and therapy. Insecurity makes for anxiety and panic. Would that the term "nervous" could be discarded. It is obscure, vague and cloaked in mystery. Emotional upset is something everyone has. Everyone can understand anxiety and fear. Everyone experiences anxiety and fear. Not everyone is "nervous." To get into the category of common experiences is important to the ill person. Disappointment brings depression. Self-consciousness makes for hypochondria. Frustrations result in temper-tantrums or "fits," sickness is the most socially acceptable evasion in our culture. So "sickness" is used as escape, to express hostility and to punish one's-self. Feelings of inadequacy result in indecision and fear, and in the mounting tensions of anxiety, fear and panic and of irritation, anger and rage. These are the somatic components affecting the function of heart, gastro-intestinal tract, endocrines, etc. Thus, there results the multitudinous symptoms in themselves so baffling to understanding and so elusive to the ordinary diagnostic procedures.

Approach should be based on the three overreactive components: insecurity, hostilities, and guilt. Every sick patient who goes to the doctor has an idea that his experiences are unique with him. The main issue at this point is to give him a different attitude toward what he thinks of an illness and desensitize him to his feelings. This will result when he realizes that his is an experience common to everyone, only he has taken it seriously. This can be done only when ordinary terms of every day experiences are used, discarding "nervousness" and "just nerves" in all their vague connotations. The recounting of the ordinary round of human experience in these three areas and an understanding that anger and fear feelings are reflex and outside the control will do much to lessen the accumulating guilt with its consequent self-punishment and explanation of its use can be quite informative. He doesn't feel equal to doing something. It isn't done. He feels guilty about not doing it, so he sits down and worries. So long as he worries about it he doesn't have to do it because he is constantly resolving the guilt resulting from not doing it by punishing himself with worry.

Further constructive directions may be based on the three components. Since security comes from feelings of belonging, belonging to organizations, group activities may be suggested. Such hobbies as involve hammering, sawing, chopping, etc., and games such as golf, tennis and badminton get rid of hostility feelings. For one's guilt feelings there should be atonement in giving service without recompense, of feeling one is needed, worth while. People have been surprisingly helped recently by Red Cross activities, particularly rolling bandages and making dressings. They belong to a group which results in feelings of belonging and enhances security. They are aggressively active with outlet for hostilities.

They are doing something worth while without recompense and thus atoning for feelings of guilt.

So, be sure you are dealing with a neurotic reaction pattern by a thorough examination. Realize that the patient is as truly ill as any patient. But, think in terms of symptoms only as indicators of the underlying personality. Avoid use of vague terms such as "nervousness" and "just nerves" but speak in terms of everyday experiences. In this process lead him to understand that he is not unique but with experiences shared by all, and then give him substitute outlets for those in-turned which have so tended to destroy his usefulness as a member of society.

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DETROIT MICHIGAN

## A Medical Program for Small Industrial Plants

MODERN MEDICINE, September, 1942, inaugurates its new department, "Medicine in Industry," with the following abstract of an article by LOUIS G. WELT, M.D., entitled, "Industrial Medical Services for Small Industries," in the July number of *Yale J. Biol. & Med.:*

INDUSTRIAL medicine and hygiene have made considerable strides during the past two decades, especially in large plants with a personnel of over a thousand. Medical programs of diverse types have been inaugurated in these plants, not with humanitarianism or philanthropy as the impetus, but because it is good business.

The great lag has been, and still is, in the small plant employing less than 500 workers. This is the group in which the greatest industrial population belongs and in which relatively little has been done to safeguard manpower. It is perhaps one of the most important phases of the problem in industrial medicine today.

Unfortunately, however, it is difficult to sell the importance of medical service to operators and owners of small plants, states Dr. Louis G. Welt, instructor in preventive medicine, Yale University School of Medicine, New Haven. The physician also concerns himself too much with healing and too little with prevention.

When both of these groups are properly educated, Dr. Welt declares, perhaps medical care will be regarded not as a luxury to industry, but as a basic necessity.

The activities of a reasonably well-organized industrial medical program applicable to either a large or small plant should embrace:

1. *Preplacement examination.* An effort to fit a man to the job so that he can produce efficiently, in a healthy state of mind and with a healthy body. It is not designed to discover a hernia for which the prospective employee can sign a waiver and then go about lifting heavy objects.

2. *Periodic physical examination.* Designed particularly for employees who fall into the following categories: (*a*) those in particularly hazardous occupations; (*b*) those in the older age groups; (*c*) those found to have had physical defects on the original examination.

3. *Nursing service.* Employment of full or part-time nurse to serve in the following capacities: (*a*) maintain a simple but efficient first-aid station; (*b*) represent the liaison between employee and employer; (*c*) determine and record the instances of absenteeism; (*d*) execute minor therapeutic procedures under the direction of the plant physician; (*e*) assist the secretary of the plant Safety Committee. The nurse is not to practice medicine.

4. *Plant physician.* On the physician's knowledge and integrity may rest the responsibility for success or failure of the enterprise. The plant physician should not be one who does occasional physical examinations for an industry, merely to bolster his income. Industrial medicine has now advanced to the station deserving the dignity of a specialty, and the doctor who is to qualify as a plant physician should be especially equipped in this branch of medicine.

Unfortunately many physicians now employed part-time by small industries know very little about industrial medicine and have never seen the inside of the plants in which their patients acquire their illnesses and injuries. To perform physical examinations and to treat industrial accidents and diseases intelligently, the physician, obviously, must know the plant and its operation and have an appreciation of its industrial problems, both mechanical and medical.

5. *Preventive medical program.* The most important phase of industrial medicine is supervision of the preventive medical program. For the most part, industrial diseases are man-made afflictions, and similarly, for the most part, they can be eradicated. Industry is one place where preventive medical technics can reach a large portion of the adult population. The plant physician is in a good

position to ask for assistance from other agencies interested in industrial hygiene.

These five points represent the basic pattern for industrial medical practice.

Unfortunately, these requisites, except in isolated instances, have not been met by small industries. The response to the attempt by the Section of Preventive Medicine of Yale University to demonstrate that adequate industrial medical care can be distributed to the small plants of New Haven proved to be quite disappointing. This disappointment has been brought into very sharp relief because of the appreciation of the fact that now, more than ever, every man-day of work is absolutely essential if the present conflict is to be won.

## "Miss War Worker"

THERE was an element of novelty in the Toronto beauty contest this year when a selection was made from among the young women working in war plants. If it was meant that way, it was a fitting tribute to this important group in the community.

But "Miss War Worker" deserves more attention than the superficial sort that was given at the beauty contest. She is more than a casual young woman picked for her looks. She is in fact a significant symbol, a person of importance now and for the future. The fact is that "Miss War Worker's" group is one upon whom the nation depends to a considerable extent for its war production and for its future population. The female war worker combines a double function: she is an industrial worker and a potential mother.

Thus the public's interest in this group of women must extend beyond that of pretty features and "hair-do." It needs very much to be centered on their working conditions. Large numbers of women are now laboring in heavy industries, doing unaccustomed work, lifting heavy weights and breathing poisonous chemical fumes. Unless protective measures are provided, the effects of these working conditions will be injurious to the women not only today, but especially in the future when the time comes for them to perform the function of motherhood. Dr. C. F. Blackler, chief of the Federal industrial hygiene department, has pointed out that the lead used in industrial paints and in welding may cause trouble to expectant mothers. Women are more subject to dangers of industrial poisoning. Continual lifting, hour after hour, is liable to injure a woman internally. The way to offset such dangers is by periodic rest periods, continuous medical supervision and health education.

Although thousands of women are now engaged in war industries and thousands more are being called, the majority of factories lack the fundamental health measures required by women workers. There are not as yet even any special government posters to warn women workers how to guard their health. Statistics show that almost twice as many women as men stay away from work due to sickness, that women are beginning to suffer from headaches, nervous strain, loss of appetite. Some are said to be showing the symptoms of chemical poisoning: gum and nose bleeding, corrosion of the teeth, chronic cough, yellow-stained faces and hands. Not only industry but future generations will pay the cost of any neglect of women workers.

Proper nutrition is peculiarly important for women. Research has shown that they need it not only to maintain health now, but to combat the strain and hazards of childbirth. Yet, as the Dominion nutrition service has found, most war plants do not have canteens where women can select nutritious meals. A recent survey of lunches eaten in war plants by women showed that the majority ate bread and jam. Dr. L. B. Pett, chief of the Federal nutrition department, reported: "Women war workers do not eat enough to support themselves and their jobs. They do not eat an adequate diet to support themselves, their jobs and a new baby. In the Montreal area, only 11% of the lunch boxes of industrial women workers

Editorial in *Toronto Daily Star*, July 25, 1942.

have "HOSPITAL" light

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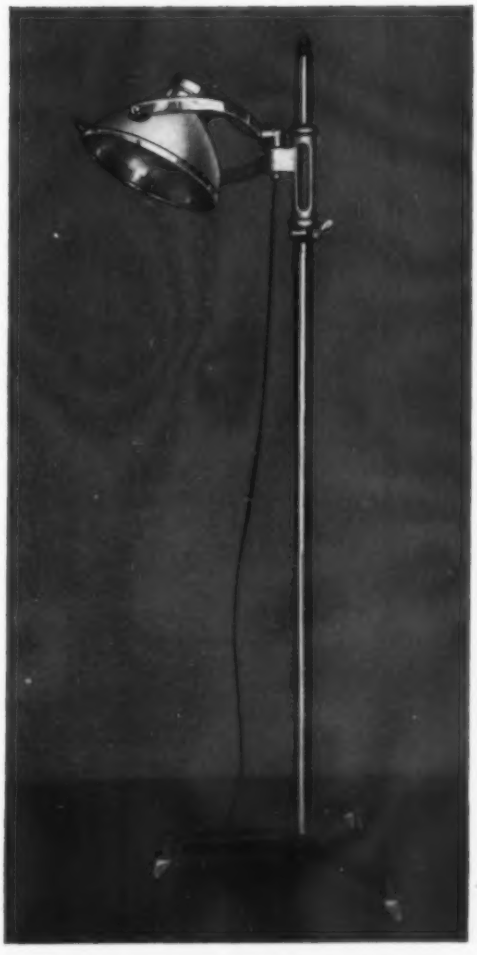

No. 1. Problem on the industrial front is keeping employees fit and conserving vital man-hours. Thus, today, the industrial clinic assumes a more vital role than ever before.

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brought to the plants could be classified as good. Where there was a cafeteria on the plant premises, the women were four times as likely to buy a good lunch as to make themselves one."

There is knowledge enough as to what should be done to guard the health of women war workers. What is needed is public interest to see that this knowledge is applied on a nation-wide scale.

## Standard Oil's Medical Service

UNDER the title "Medical Good Neighbor," *Time*, September 21, 1942, has the following account of Standard Oil Co. of New Jersey's medical department:

Geologists in Venezuelan jungles, vice-presidents in a Manhattan sky-scraper, sailors on tankers, stenographers in Buenos Aires—some 150,000 men, women and children all over the world are under the care of the medical division of Standard Oil Co. of New Jersey, which has the most elaborate—and probably the biggest—industrial medical organization of any U. S. business.

Its medical personnel consists of 108 full-time doctors, 17 part-time doctors, two dentists, 123 nurses, 23 laboratory and x-ray technicians, 24 pharmacists, 32 first-aid men, 331 orderlies, nurses' aides, etc. It has 29 hospitals (1,121 beds) in Peru, Argentina, Venezuela, Colombia, Aruba (Dutch West Indies). It also had several in Sumatra. It runs the only accredited nursing school in northern Argentina. It also publishes the world's only intercompany medical journal, *The Medical Bulletin*, in which Standard's DR. ROBERT C. PAGE last week reviewed the company's unflagging, pioneering medical work in the last 10 years.

Organizer of Standard's medical department is benign Yaleman DR. WILLARD J. DENNO, 67, who first came to the company in 1918. He was soon joined by DR. ALVIN SCHOENLEBER, 58, who learned tropical medical problems in Panama while the Big Ditch was being dug. When these two began their work, industrial medicine had a bad name. Only medical misfits went into the field. Largely through the efforts of DRS. DENNO and SCHOENLEBER, industrial medicine now attracts first-class doctors from all over the U.S.

In the U.S., Standard's medical service to its employees is not unusual: all occupational injuries are treated, other ailments are diagnosed. But in the tropics, Standard undertakes full medical care not only of its U.S. and foreign employees and their families, but also of a good many people who just happen to live near by.

Standard sends its doctors into the jungles with geologists and wildcatters even before a new oilfield is opened. The medical unit picks the camp site, finds and tests a water supply, supervises disposal of sewage and garbage, directs eradication of malaria-carrying mosquitoes, flies and other pests. More than 100 Standard workers do nothing but fight malaria by draining swamps, oiling mosquito breeding grounds, etc. In the last six years, amebic dysentery, No. 2 cause of tropical sickness, has dropped from 27% to 5% among Standard employees.

Year before last, 1,514 babies were born in Standard hospitals, mostly to Latin Americans. Mothers are given lectures and courses on prenatal and postnatal care—*e.g.*, unless the poorer classes of Latin American women are told to stop nursing their children, they will suckle them for two or three years.

In Venezuela and Colombia, Standard has several air ambulances to whisk emergency cases from the field to hospitals. Between Barranca and El Centro, Colombia, it operates a unique rail ambulance.

The southern republics now insist that all new doctors be "nationals." Anticipating this move 10 years ago, Standard has been bringing South American doctors to the U.S. for specialized training. This year the company plans to take promising youngsters right out of South American undergraduate schools, bring them to the U.S. for their complete medical education.

U.S. nurses are still welcomed in South America. Some Latin girls turn up their noses at the drudgeries of nursing. But Standard doctors have discovered that Latin American street-walkers often make gentle and reliable nurses.

In last summer's war between Peru and Ecuador (TIME, Sept. 1, 1941), the only medical facilities near the jungle battlefields were two hospitals in northern Peru belonging to a Standard subsidiary. Company ambulances, planes and trucks hauled casualties of both armies to its hospitals, which set up extra cots in halls and patios. "We spent days removing pieces of shrapnel and bullets from the wounded," wrote DR. LEWIS FRASER last week in *The Medical Bulletin*.

When a Nazi submarine shelled the island of Aruba last February, Standard's medical staff received 27 casualties for hospitalization, treated 22 others clinically, mostly for burns from flaming oil.

Two days earlier Standard's excellent medical facilities in Sumatra—12 hospitals (278 beds), nine doctors, 21 nurses, 136 attendants—had been submerged by the onrushing Japanese. They have not been heard from since.

## LETTERS

TO THE EDITOR:

MY ATTENTION has just been called to an error in a reference cited in my paper on "Respiratory Infections" which appeared in the August issue of INDUSTRIAL MEDICINE (p. 373). Specifically, reference is made to Stafford having used an oral vaccine tablet which was made from soluble antigenic derivatives. This is an error, since the tablets are made from the whole killed bacterial organisms.

—JOHN C. SESSIONS, M.D.

TO THE EDITOR:

DR. LOWELL S. SELLING'S article in your September issue, I believe, has far reaching possibilities. I have talked with army men recently who are preoccupied with the necessity of doing more than just diagnosing and discharging patients with mental disorders. They feel that with better understanding and appraisal of one's effective capacity, in the face of mental disorder, there may be places for some of these people in military life. Certainly in civilian life, aside from industry, with the necessity to mobilize man power, we may have to fall back on case salvaging of psychiatric patients. Many of these people can be used, as DR. SELLING brings out. Recently in *Readers Digest* there was a description of a clinic operating in Connecticut, where compensation cases, the maimed, the crippled and the disordered were studied and, if I recall correctly, 85% of the people studied were put back into industry. I can't help but believe this subject is a field that needs much attention. For example, think of the thousands of people in our state hospitals, many of which are capable of doing work under supervision, disregarding the thought of them ever getting into industry. If they simply could be given a chance to become productive in some way during the emergency, what a mass of man power and man hours this would give us.

—T. A. WATTERS, M.D., Professor of Neuro-Psychiatry, Tulane University School of Medicine.

DR. W. F. MCANALLY, since 1930 Medical Director, East Ohio Gas Company, Hope Natural Gas Company, and Peoples Natural Gas Company, with headquarters at Pittsburgh, and, since 1924, Major, Medical Reserve Corps, has been recalled to active duty and is stationed at Edgewood Arsenal, Maryland.

NO LITTLE complaint is heard these days from holders of hospitalization insurance when they learn that due to crowded conditions of many of our hospitals they cannot have the choicest of rooms. One such complaint was made because children in the family who had gone in for a tonsillectomy were "parked" in a hospital corridor for a few hours following operation.

—Editorial Note, in *J. Indiana State M. A.*, August, 1942.

# INDUSTRIAL HYGIENE SECTION

This Industrial Hygiene Section is published to promote sound thought upon and concerning industrial hygiene. To that end it will contain articles, discussions, news items, reports, digests, and other presentations, together with editorial comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The Editorial Committee will exercise its best judgment in selecting for publication the material which presents most exactly the factors affecting industrial health and developments for control of potentially injurious exposures. The editors may not concur in opinions expressed by the authors but will endeavor to assure authenticity of fact.

**The Science, the Law and the Economics of Industrial Health**

Volume 3 | October, 1942 | Section 4


## How Important is the Protection of Employee Health?

EVERY good American is anxious to do his utmost in advancing our war effort to a victorious conclusion. In these days of stress, that is merely stating a truism. The only question is what constitutes the maximum contribution each individual, considered as an individual, can make to a common cause.

At the present moment the trained technical manpower in the United States is quite inadequate to the needs at hand. The statement has been made that "the total technical and scientific personnel of this country is in the order of one quarter of a million men and that Germany has twice as many men in this classification with a population about two-thirds of ours." Whatever the relative situation, it is recognized that shortages of chemists, engineers of all classifications, and physicians trained in industrial practice have existed for a considerable period of time. Efforts to train such personnel in two- or three-month courses have been made, and these efforts are very necessary in order to compensate for the obvious shortages. Well qualified observers agree that, however meritorious these efforts may be, they do not solve the problem of fully trained personnel, as much longer periods of training in specialized fields have proved the only way adequately to solve the problems of employee health.

As has been stated many times, the elimination of conditions leading to occupational disease and fatigue of the worker involves the efforts of men trained in various special fields. In addition, these men have, over a period of time through post-graduate study or extensive experience, become expert in the several phases of industrial hygiene: evaluation of health hazards, control of injurious working environment, and industrial aspects of preventive medicine. In each of these special fields men have acquired experience and training which cannot be readily replaced.

In the last few months some of this trained, professional group, already inadequate as to numbers, has been further depleted by individuals taking up commissions in the armed forces. In a number of instances, the men have continued in industrial hygiene or closely allied activities after being commissioned, but there has been an increasing tendency for men to seek commissions voluntarily where the training in industrial hygiene is not to be utilized. If the working population, all of whom will soon be engaged in some form of essential activity, is to be adequately protected and kept on the job at full efficiency, this depletion of trained industrial hygienists must be stopped.

Recent statements by the President at the dedication exercises held at Bethesda, Maryland, indicate that the government desires the protection of the workers' health and efficiency. Other statements by responsible government officials emphasize this attitude and make clear the present intent of official circles.

While this belief continues, it becomes the patriotic duty of the men who have become expert in the field of employee health to remain on their present jobs and the duty of employers to assist in this process by requesting that these men be given occupational deferment. In addition, all such men should be registered in the "National Roster of Scientific and Specialized Personnel" at Washington. Should individual local

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boards rule adversely to occupational deferment, this National Roster should be informed at once at the same time that appeals are being made. It should be recognized that each case is settled on its own merits and that no group deferments are possible. However, if appeals are not made, time is not then available for full consideration by those official agencies set up for the purpose of conserving technical manpower as to where the individual may do the most for his country's war effort.

Some individuals having special training in other fields which are being drawn on heavily for the armed services may feel that they should volunteer for such service. At the present time these trained men would be doing a more patriotic act if they place all the information concerning their status in the hands of boards qualified to review this training, as these boards will have a much better idea concerning the place in the war effort which may best be filled by the trained specialist.—GORDON C. HARROLD, PH.D.

THE foregoing statement, prepared by the Secretary of the American Industrial Hygiene Association during its first three years of existence, is in accordance with recent viewpoints of the United States Government. Under the heading "Manpower," a comprehensive discussion of the situation as it involves scientific and specialized personnel was published on pages 788-790 in the June 25, 1942, issue of *Chemical and Engineering News*, an official publication of the American Chemical Society. Whereas this discussion referred to the quarter of a million personnel included in the National Roster of Scientific and Specialized Personnel, it refers with even more force to the comparatively small group with training and experience in industrial hygiene.

The mechanics to be followed in the event such a man is called by the local Selective Service Board is outlined in this discussion by the American Chemical Society and is reproduced below:

"If, in spite of everything which can be done, such a man cannot be replaced, there should be *no hesitancy about insisting on further deferment* with a presentation of all the evidence as to the man's necessary position in the organization and the efforts which have been made to train or obtain a man for a replacement. If the local board refuses deferment in the case of such a necessary man, then an appeal should be made by the man immediately on the basis of his training and experience and the necessary nature of the work in which he is engaged. This appeal has to be made within 10 days of the date of the 1-A notice. He should immediately notify his chief of the appeal. If this appeal is lost he should appeal to his State Selective Service Board and should also send a statement of the appeal, together with his draft number and the address of his board, to any professional organization of which he is a member, such as the AMERICAN CHEMICAL SOCIETY and also the National Roster of Scientific and Specialized Personnel, in Washington, with a request that they give any help they can by writing to the local and state boards. It should be emphasized that the only matter involved is maximum effectiveness of the national effort. . . ."

## Control of Industrial Health Hazards

E. C. BARNES,
*Industrial Hygiene Engineer,*
*Westinghouse Electric & Manufacturing Company,*
*East Pittsburgh, Pennsylvania*

THE function of our Industrial Hygiene Department is to assist in preserving industrial health. From a rather broad viewpoint it seems that actual industrial health hazards can be reduced to a minimum when the use of potentially hazardous materials is satisfactorily controlled, and this control is confirmed by adequate physical examinations of the employees.

With this principle in mind our program has been developed over a period of nearly 10 years and its results are shown by the experience for the first six months of this year. There were five lost-time occupational disease cases among 85,000 workers. Three of these were cases of dermatitis, one a case of lead poisoning, and one a case of temporary disability from welding fumes. A rather large percentage of these 85,000 persons are exposed to a wide variety of potentially hazardous materials. These exposures include different types of foundry operations, use of many different types of of solvents, use of chlorinated hydrocarbons, a great variety of welding operations, many different types of electroplating, extensive use of cutting oils and compounds, use of x-rays and radium.

In large manufacturing operations where the use of many different types of materials is involved, it is necessary for the Industrial Hygiene Department to have a knowledge of the various uses of all these materials so that the plant engineers and supervisors can be advised of any hazards which may be created. So that our Industrial Hygiene Department can be kept informed of the introduction of potentially hazardous materials, a numbered material card which is utilized in the Engineering Department is referred to the laboratory when any materials are approved for use or when existing materials are changed. This is not a special card prepared for the Industrial Hygiene Laboratory but rather it is a form which is used by the Engineering Department and many shop departments, and contains a description of the material, its engineering characteristics, composition, etc.

Each new card which is issued or old card which is revised is reviewed by the Industrial Hygiene Laboratory, and if the material is of such a nature that it might create a health hazard or a fire and explosion hazard, a suitable caution clause is placed on the top of the card so that all persons using this card or the material will be informed on its characteristics. Only brief general statements are included on these cards such as "Do not breathe dust from this material" or "Avoid contact of this material with the skin." The caution clauses which are included on these material cards serve as a guide to engineering and other supervisors in selecting materials for various applications. More specific information about the actual use of these materials is included in the process specifications. These various individual materials may be incorporated into a number of different processes and these individual processes are described in a standardized method in a Process Specification.

When a new process is developed, the engineer prepares a written description of it, including the names and numbers of all materials involved. This preliminary description is then referred to the Headquarters

Engineering Department where it is revised if necessary and prepared for issue to the shop departments in a standardized form. Necessary approvals are obtained before it is issued.

Prior to issue, all new or revised Process Specifications are referred to the Industrial Hygiene Laboratory for consideration. At this time the Laboratory determines whether the specification as written may create any type of health hazard when it is finally put into production in the shop. When necessary, the proposed process is discussed with engineers and shop supervisors to determine whether the potential health hazards have been given full consideration and there may be some changes made either in materials or the description of the process so that health hazards will be minimized.

In addition to this review of the specification, certain basic information regarding the safety or health hazard is included. On specifications which call for the use of potentially hazardous materials, a tabular heading as indicated in Fig. 1 is included. This tabular heading is self-explanatory to a considerable extent. It classifies the material as to flash point and includes information about the maximum permissible concentration from an explosion standpoint.

Appropriate safety factors are included in the calculation of these limits.

It includes data on the maximum permissible concentration which is permitted at the breathing zone of workers. The maximum permissible concentration for breathing of dust or vapors is divided into two sets of values; the first value being applicable where the workman's exposure may vary between one and eight hours per day, and the second where the workman's exposure is less than one hour per day. Values which are placed in the column headed one to eight hours per day are the generally accepted limits such as the limits recently established as American standards by the American Standards Association. In the column headed less than one hour per day, the values may be either the same as the previous column or a higher value depending on the particular material involved. In those instances, where irritative reactions determine the limit, both values are usually the same. Where the toxic effects seem to be somewhat proportional to the amount of material inhaled, the value for the column headed less than one hour per day is usually indicated as twice that of the other. In the last two columns of this table, an indication is given as to the need for personal protective equipment. In those cases where accurate data cannot be supplied, a footnote is added to the table indicating the general nature of the hazard from the material.

With such information recorded on each Process Specification, both the engineers and shop supervisors are informed, in a definite manner, as to the limits which must be maintained in order to insure safe operating conditions. Since this information becomes a part of the actual process specification, it becomes a part of the specified operating conditions, the same as the actual description of the process.

When a question arises as to whether the conditions outlined in the Process Specification are fulfilled, the Industrial Hygiene Laboratory is available to make measurements and study the operating conditions. A report of the various concentrations which may have been determined is made to the proper supervisor who can then take any necessary steps to bring his operations in line with the specified conditions.

This procedure of referring the Process Specifications to the Industrial Hygiene Laboratory has proved very helpful under present conditions, where many substitutions of materials are being made. In a recent case it was found necessary to substitute a solvent containing benzol for another which was less toxic. The significance of this change was brought to the attention of the proper supervisors and sufficient changes in the processing equipment were made to insure healthful operating conditions. In this instance it was possible to use totally enclosed equipment, thus avoiding exposure of the workmen.

In those instances where it becomes necessary to establish a routine sampling procedure at rather frequent intervals, the necessary sampling equipment is obtained by the individual plant or department after a preliminary survey by the Industrial Hygiene Laboratory. This procedure is followed only in those cases where suitable personnel are available for operating this equipment and the sampling equipment is suitable for use in this manner.

The results of such routine determinations are reviewed by the Industrial Hygiene Department at frequent intervals.

The Industrial Hygiene Laboratory occupies approximately 1500 square feet of floor space and is

SAFETY REQUIREMENTS: (For explanation, refer to Process Specification No. _____)

| Material | Fire and Explosion Hazards | | | Potential Health Hazards | | | |
|---|---|---|---|---|---|---|---|
| | Flash Point | Maximum Permissible Vapor Concentration | | | | Handling | |
| | A Less than 80 F | Ovens and Work Places | | Breathing Zone | | See Safety Manual or Safety Supervisor | |
| | | Per cent Volume in Air | | Parts per Million in Air | | | |
| | B 80-110 F<br>C Over 110 F | Ordinary Equipment | With Flammable Vapor Alarm | For 1 to 8 Hr per Day | For Less than 1 Hr per Day | Corrosive Requires Personal Protective Equipment | May Require Personal Protective Equipment |
| Benzol | A | 0.35 | 0.70 | 100 | 200 | No | Yes |
| Toluol | A | 0.33 | 0.65 | 200 | 200 | No | Yes |

Fig. 1.
Tabular heading used on Process Specifications

Fig. 2.
The analysis of lead samples by the dithizone method

located adjacent to the Medical Department in our largest plant. It was designed to be used entirely as an Industrial Hygiene Laboratory and is provided with equipment essential to this type of work. No provision is made for animal experimentation, since all such work is referred to an established laboratory as the occasion demands.

A portion of the laboratory equipment is shown in the accompanying photographs. Fig. 2 shows the equipment used in the determination of lead by the dithizone method. On some occasions this method is also used for determining other metals. Fig. 3 gives a general view of the Industrial Hygiene Laboratory. Fig. 4 shows a portion of the room used for the analytical chemical work.

A separate room equipped with the necessary hoods, etc., is used entirely for chemical analysis. This laboratory room is equipped with such special apparatus and glassware as has been found necessary for accurate analysis of many different materials significant in industrial hygiene work.

Another section of the laboratory, which is primarily a physical laboratory, is equipped with such instruments as the dropping mercury electrode, spectrophotometer, refractometer, and gas chamber. The gas chamber is arranged so that different and known concentrations of various types of gases and vapors can be established and used for the calibration of sampling equipment and for the development of new sampling methods.

A separate room is provided for balances, and another separate room for microscopic work. A microprojector is installed in the microscopic room.

A separate office is arranged for the personnel and for the keeping of records, publications and books. There are two industrial hygiene engineers and two chemists in the laboratory.

In addition to air samples and their analysis, laboratory facilities are used to a considerable extent in connection with the pre-employment and periodic physical examinations of employees—for making such determinations as rate of urinary lead excretion and fluoride excretion.

OUR periodic physical examination program is utilized to the greatest possible extent as a means of controlling exposure to various materials in the plant, in addition to its providing a check on the health of the employee.

In order to accomplish this result, a detailed routine procedure for handling the periodic physical examinations has been established. The Industrial Relations Department keeps a rather accurate record of all of the different jobs in the plant. Each job on which there may be from one to 25 or 50 employes is reported on a job specification card such as is shown in Fig. 5. All of the different jobs in the plant have been studied by the Industrial Hygiene Department working in conjunction with the shop supervisors and the Medical Department, and specific pre-employment and periodic examination numbers are recorded on the card to indicate the nature of the examination.

The different types of examinations are as follows: No. 1 is the usual basic type of physical examination. Examination No. 2 covers special chest examination, including x-ray, in addition to the basic examination. This examination is used where there is exposure to

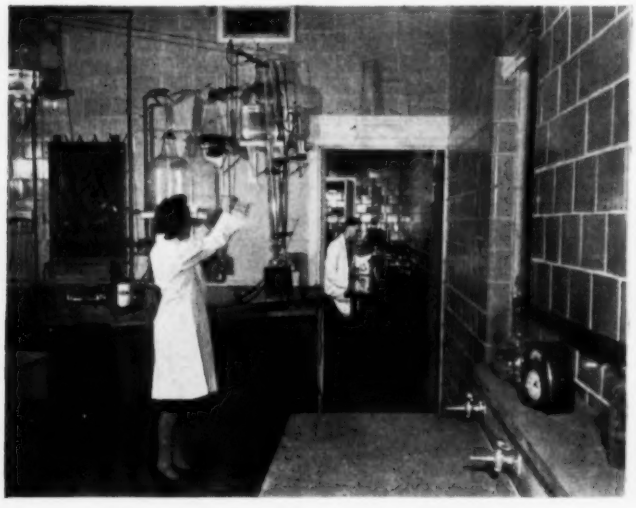

Fig. 3.
A general view of the Industrial Hygiene Laboratory

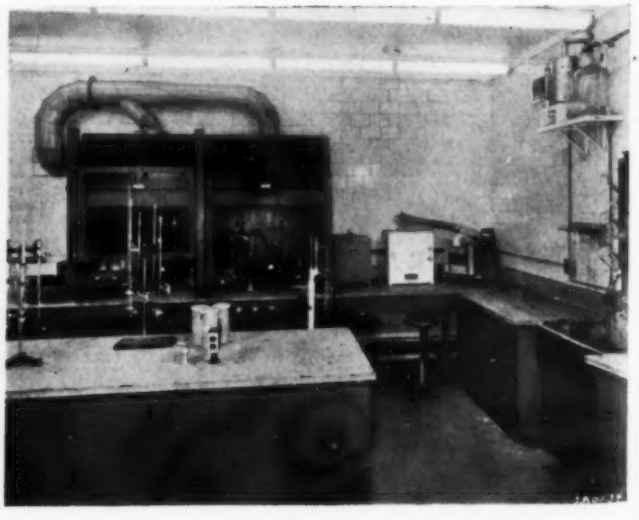

Fig. 4.
View in room used for chemical analysis

dusts or other materials that might injure the lungs. Examination No. 3 calls for a complete blood examination, in addition to the basic examination, and is utilized on most jobs where there may be exposure to lead, solvents, etc. Examination No. 4 is the basic examination plus a special examination of the skin, and may include patch tests as indicated. It is used where there is exposure to materials which may produce a chronic dermatitis.

By using these four examination numbers, it is possible to indicate, both for the benefit of shop supervisors and for the Medical Department, the type of examination which is required by the materials and working conditions surrounding the employees on a specific job. These examination numbers and the frequency of the periodic examinations are recorded on each of the job specification cards. Copies of these cards are in the hands of shop supervisors, Industrial Relations Department, and Medical Department. On the Medical Department copy of this card, special notes regarding either pre-employment or periodic physical examination factors may be recorded as indicated on the bottom of the card (Fig. 5).

With a system such as this, the examining physician is provided with a full description of each job so that the proper physical examination can be made. In addition to the determination of the physical condition of the worker, it is possible to utilize various methods of determining the exposure to the materials used in the shop by the worker. For example, where the Job Specification Card indicates exposure to lead, or any of its compounds, the examining physician will collect a special urine sample to be analyzed by the Industrial Hygiene Laboratory. If the Job Specification Card indicates exposure to benzol, a special urine sample is collected and analyzed for sulphate ratio by the Industrial Hygiene Laboratory.

This method of determining exposure is helpful both to the examining physician and to the Industrial Hygiene Department. If there is any abnormal exposure, the physician is warned to look for signs of disability or it may explain unusual findings obtained during the clinical examination. Likewise, if abnormal exposure is not indicated it may be helpful in making a diagnosis.

Any time these special samples indicate abnormal exposure, that particular job is investigated by the Industrial Hygiene Laboratory and corrective measures recommended to the proper supervisor. This has been especially helpful in the control of exposure to a number of toxic materials, and this principle is applied whenever satisfactory methods are available. It is much more satisfactory to depend upon the measurement of exposure in this manner than to depend upon unfavorable physiological reactions as shown in the clinical examination.

As an example of the value of this program in controlling exposure and promoting healthful working conditions, the experience during the first six months of this year is of interest. From the total number of urinary lead determinations 35 indicated abnormal exposure. All of the jobs on which these persons worked were investigated by the Industrial Hygiene Laboratory and many corrective measures have been taken to reduce the exposure. Additional urine samples are

**WHEN POSSIBLE FILL THIS JOB BY PROMOTION**

OCCUPATION Welder, Electric Arc. NO. 152 CLASS _____ JOB NO. 10
DEPT. Switchgear SECTION NAME _____ SECTION NO. R-16
MINIMUM AGE 21 MINIMUM WEIGHT 130
PHYSICAL EXAM.—PRE-EMPLOYMENT NO. 2 & 3 PERIODIC NO. 2 & 3 YRS. 2

CHECK BOTH SQUARES WHEN QUALIFICATION IS ABSOLUTELY NECESSARY. TO MARK ONE QUALIFICATION IS DESIRABLE BUT NOT ESSENTIAL.

| | | | | |
|---|---|---|---|---|
| ☐ ☐ MAN | ☐ ☐ SPEAK ENGLISH | ☐ ☐ STRONG | ☐ ☐ ACCURATE | ☐ ☐ USE JIGS |
| ☐ ☐ WOMAN | ☐ ☐ READ ENGLISH | ☐ ☐ QUICK | ☐ ☐ THOROUGH | ☐ ☐ GAUGES |
| ☐ ☐ TALL | ☐ ☐ WRITE ENGLISH | ☐ ☐ CAREFUL | ☐ ☐ GOOD MEMORY | ☐ ☐ TEMPLATES |
| ☐ ☐ MEDIUM | ☐ ☐ COMMON SCHOOL | ☐ ☐ PATIENT | ☐ ☐ READ SCALE | ☐ ☐ MICROMETER |
| ☐ ☐ COLORED | ☐ ☐ | ☐ ☐ OBSERVANT | ☐ ☐ SET UP WORK | ☐ ☐ PRINTS |

TOOLS OPERATIVE SHOULD OWN 6" Scale
TYPE AND SIZE OF EQUIPMENT Arc Welding Set
MATERIAL USED Sheet and structural steel, aluminum
NUMBER ENGAGED IN WORK _____ INSTRUCTION PAY PERIODS _____
SAFETY REQUIREMENTS Welders equipment, safety shoes, gloves.
REMARKS:

EFFECTIVE DATE 1/1/41

JOB SPECIFICATION—CHECK EMPLOYES
WESTINGHOUSE FORM 21499 B

| KNOWLEDGE AND TRAINING | SPECIFIC DEMANDS | RESPONSIBILITY |
|---|---|---|
| POINTS | POINTS | POINTS |
| _____ BASIC EDUCATION | _____ PHYSICAL APPLICATION | _____ EQUIPMENT |
| _____ EXPERIENCE | _____ MENTAL APPLICATION<br>_____ VISUAL APPLICATION | _____ PRODUCT |
| _____ APTITUDE | _____ UNUSUAL FEATURES | _____ SAFETY OF OTHERS |

JOB CONDITIONS

| | | |
|---|---|---|
| _____ EXCESSIVE HEAT | _____ DUST | _____ GREASE |
| _____ EXCESSIVE COLD | _X_ FUMES | _____ DIRT |
| _____ DAMPNESS | _____ ACIDS | _____ NOISE |

DESCRIPTION OF WORK Weld sheet steel and structural steel for frames, switchhouses, etc. Weld aluminum and non magnetic parts. Lift up to 100# weights. Part of welding rods may contain fluorides.

Pre-Emp. Factors Lungs, blood
Periodic Factors Lungs, blood, eyes, urine if desirable.

| FOREMAN | GENERAL FOREMAN | TIME STUDY DEPT | SUPERINTENDENT | OCC. RATE COMM. |
|---|---|---|---|---|
| | | | | |

JOB SPECIFICATION—CHECK EMPLOYES
WESTINGHOUSE FORM 21499 B BACK

obtained on all these cases to determine whether the corrective measures are actually reducing the lead exposures. From these cases there was only one with clinical symptoms which required a loss of 35 days from work. In all the other cases the exposure has been reduced sufficiently so that loss of time from work is not expected. This illustrates the application of well-known industrial hygiene principles.

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## Control of a Lead Hazard

JOHN B. LITTLEFIELD,
*Industrial Hygienist,*
*The American Brake Shoe and Foundry Company*

WHEN the present war is over, the industrial hygienist can derive some satisfaction from the fact that he has been able to add considerably to the war effort by aiding in the control of hazards which might otherwise have limited production. This is a preliminary report on just such a case. Being fundamentally concerned with the maintenance of good health in its plants, The American Brake Shoe and Foundry Company has established a Medical and Industrial Hygiene Department to protect the welfare of its employees and to make each plant a better place in which to work.

The greatly increased rate of production in a brass foundry brought on an incipient lead hazard which might have prevented continued operation at full capacity. The problem was attacked with an industrial hygiene and medical survey; the most critical points were relieved by temporary measures while, at the same time, a long-term program involving a radical change in practices was developed. The difficulty of obtaining material and equipment made it necessary to improvise to obtain as much improvement as possible, while production kept to schedule. Although all the data of the medical survey have not yet been compiled it can be stated that no serious cases of lead intoxication were observed.

Four departments will be discussed. Department A consists of a furnace bay, the foundry, chipping and sand blasting sections, all in one large building and the metal storage and classification with welding and another chipping and cleaning section in an adjacent connected building. Department B is another connected building and includes the grinding, bearing lining and shipping operations. Department C is the core room and up to the time this survey was started was right in the foundry but was then moved into a new wing, still open to the foundry at the side most distant from the furnaces. Department D is in a separate building where the only operations are the preparation of various alloys for babbitt and solder.

Three types of furnaces are used for melting brass and bronze; these are ground or pit furnaces, Schwartz furnaces and revolving furnaces. All are gas fired and all of them are located in the furnace bay which is approximately 38 feet high and was ventilated by swinging sash on the upper part of each side. One side of this bay was open to the foundry to a height of 15 feet. The foundry is laid out with floors at right angles to the length of the furnace bay; molds are prepared by hand and by machine and lined up on the floors. Metal is brought from the furnaces in crucibles and large or small open-top ladles which are either transferred from the furnace bay crane to the crane running across the particular floor to be poured or are carried by hand, depending upon the size.

Previous to this survey basophilic aggregation tests had been made periodically and one-gallon urine samples had been collected for lead analysis. Little correlation could be found on the results of these tests and the urine samples were so difficult to collect that a sufficiently representative number of employees could not be covered. A program of spot urine sampling was initiated and this proved much more reliable as better supervision was possible and less resistance on the part of the employees resulted. Since the basophilic aggregation tests still showed no correlation with the urine analyses and did not prove to be a means of predicting possible cases of lead intoxication, they were discontinued. A definite indication that the spot sampling technique was carried out without contamination is the uniformly low lead excretion observed on new employees who had no previous history of lead exposure. In several instances a new employee did show a high rate of excretion, but in each case investigation revealed that he had come from a plant which had a definite exposure to lead.

Air sampling was done at intervals throughout the six-month period covered in this report. A number of sampling stations were selected and repeat tests were made at each from time to time, so as to include all representative conditions of weather, ventilation and variations in operations. Samples collected at various stations on the molding floors showed a high degree of variability and it was found that samples collected over short periods were too greatly influenced by a peak condition which may have occurred. For example, on a particular floor, if the molds were poured for five to 10 minutes out of this short period, extremely high concentrations resulted, but if the sample were continued for an hour or more the result was much lower. For this reason one hour was selected as the minimum sampling period and in some cases samples were collected continuously for the entire day, changing the collector each hour. The data on each sample include wind direction and velocity, temperature inside and outside, position of ventilators, number and location of windows open, operations in vicinity of sampling point and a list of furnaces in operation. While the sample was being collected the direction of air currents was checked with a smoke tube. An effort was made to collect certain samples when only one operation was in progress, as when only the chipping or sand blast crews were working or when only certain furnaces were in operation.

Air samples for analysis were collected with the electrostatic precipitator using aluminum collection tubes. The tubes were received from the laboratory individually wrapped; as soon as a sample was collected the tube was wrapped in a new sheet of cellophane, twisted together at the ends and returned to the laboratory for analysis. At regular intervals one tube, handled the same as the others except for the actual collection of the sample, was sent in for a blank determination; results on these were uniformly low. The flowmeter on the precipitator was checked on three occasions against an orifice type flowmeter and was frequently checked in the field by means of a velometer.

It was not long before certain conditions which were responsible for a large part of the general atmospheric contamination in the foundry became apparent. The rising hot gases in the furnace bay seemed to cause a good movement of air from the foundry, along the floor, into the furnace bay. By using a ladder and smoke tubes it was found that in general, however, there was a movement of hot gases, often laden with fume from the furnace bay under the crane rails into the foundry. These convection currents served to circulate the con-

taminated atmosphere throughout the entire department. This condition was controlled by three steps; (1) by temporarily shifting some of the heavy melting operations most productive of fumes to the night shift when there were very few men in the foundry; (2) by erecting sheet metal baffles between the furnace bay and other sections of the building down to within seven feet of the floor, and (3) by the installation of power ventilators on the furnace bay to provide more rapid removal of hot gases and fumes. The second step, the erection of the baffles, was finished as rapidly as the sheet metal could be obtained and effected a pronounced improvement. The stack effect of the high furnace bay was increased and we found a movement of air from the foundry into the furnace bay at all points below the baffle with a velocity generally exceeding 100 linear feet per minute. Not only did this greatly improve the foundry but it also provided a level of cleaner air in most parts of the furnace bay except along the far wall. This section is being improved by baffles over the first tier of windows to direct incoming fresh air toward the floor. The stack effect of the furnace bay was further improved and fume was prevented from piling up in one end by dividing this long bay into five sections by sheet metal partitions from the roof down to crane clearance.

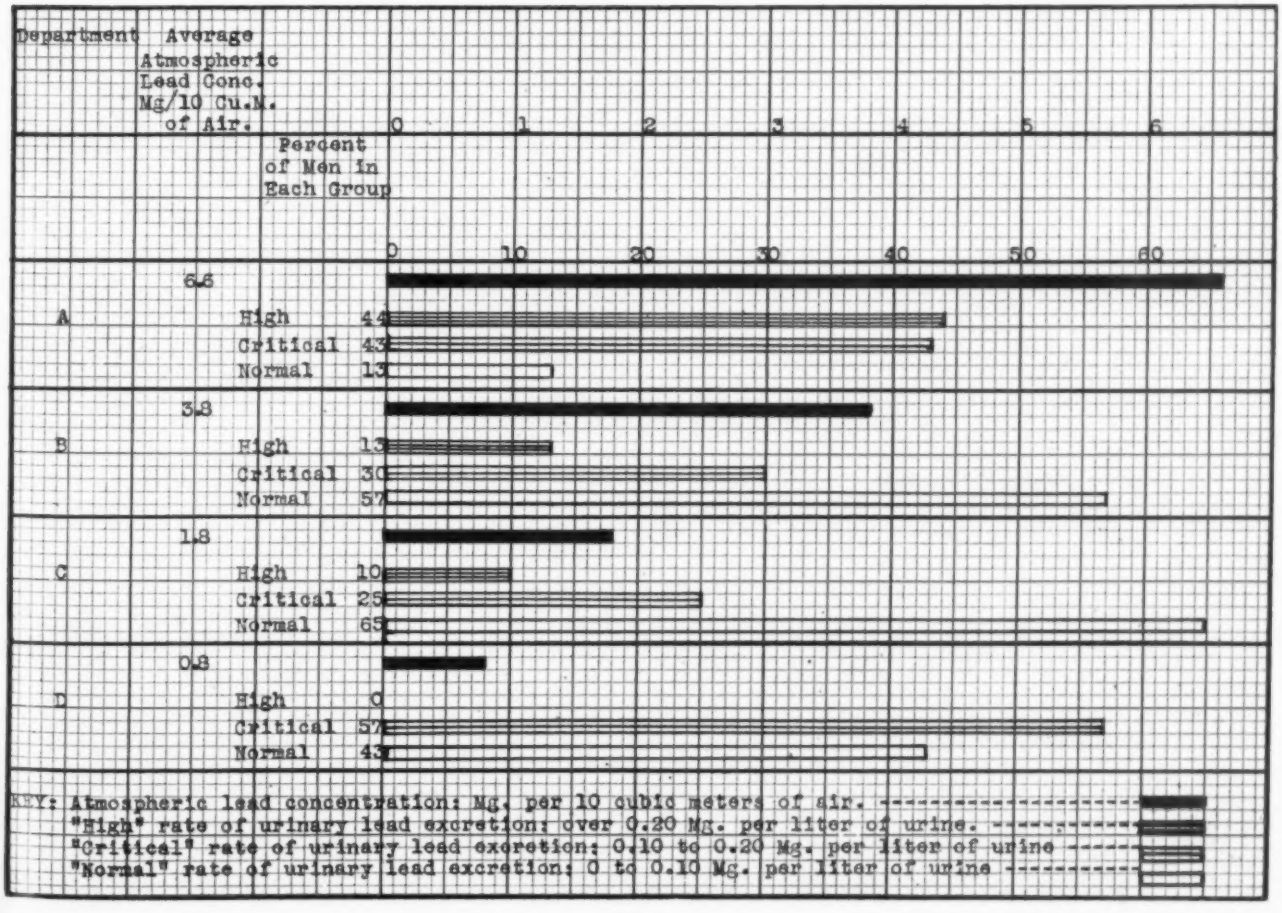
Finally the installation of 17 power ventilators with a total capacity of 144,000 cfm in the roof of the furnace bay serves to give more positive control of the ventilation system regardless of wind direction. This will be augmented by the introduction of tempered clean air along the side of the foundry most distant from the furnace bay. It is necessary to maintain an adequate movement of air across the foundry to remove the fumes liberated there while transporting and pouring the hot metal.

While this program greatly reduced the exposure of most of the men to lead fume, some men were still exposed to high concentrations for short periods while tapping the furnaces, transporting the ladles and pouring the molds. Although the increased air movement did reduce their exposure it was thought necessary to eliminate these peak exposures by means of respirators. Many respirators had been issued but without care or supervision they became useless and the men objected strenuously to wearing them. In fact they would not keep them on unless they were watched and then usually wore them with the straps so loose that none of the air they inhaled passed through the filters. Two new respirators were provided for each man and marked with his clock number. One man was assigned the job of distributing and cleaning the respirators and each morning he goes through the shop exchanging the clean respirators for the dirty ones, making sure that each man assigned one has it. He takes the dirty respirators to a special room built for the purpose and provided with a large double sink, disassembles them, scrubs the rubber and metal parts in a soap and antiseptic solution, rinses them in hot water and hangs them on a rack where they are dried by a fan. When he reassembles the respirators he uses a new filter in the "Dust" type or replaces the same pair of marked fume filters in the "Fume" type. If the fume filters show sufficient loading he replaces them with new ones.

At the start of this program each man who needs a respirator was instructed in the proper way to wear it and since then we have had much better cooperation.

TABLE 1.

RELATION OF ATMOSPHERIC LEAD CONCENTRATION TO RATE OF URINARY LEAD EXCRETION



It was not considered practical to require a man to wear a respirator throughout the entire day; instead instructions were issued that they be worn when tapping, carrying ladles or pouring; other men were instructed to wear "Dust" respirators when doing certain jobs where a local dust condition was obvious, as when chipping a dirty casting which had not been previously sandblasted.

Some impinger samples were collected but the dust counts were surprisingly low; this is explained by the fact that the castings are shaken out as soon as the metal has sufficiently hardened and most of the sand is still damp. Aisles and floors are well sprinkled with water before any sweeping is done.

During the six-month period while the possible immediate changes were being effected, and while air samples were being periodically collected a large number of spot urine specimens were obtained from the men in the four departments under consideration. Table I shows graphically the relation found between the average atmospheric lead concentration and the rate of urinary lead excretion for each group. Some explanation of this table will be necessary, for there are many variables to consider.

Department A has perhaps the greatest labor turnover, but, on the other hand, acquires the greatest percentage of new employees with a past history of lead exposure. The 13% of the men in this department who show a normal rate of lead excretion are not confined to the more recent employees; among this group will be found some of the older employees with 15 to 20 years' exposure in this plant. The fact that 44% of the men were in the high range with a rate of excretion exceeding 0.20 mg. per liter, is very serious, and the added 43% in the critical range, 0.10 to 0.20 mg. per liter, only add to the seriousness of the situation. Fortunately the improvements already completed appear to have cut the average exposure to less than half that shown in Table I and the number of men in the high and critical groups is steadily decreasing.

Department B illustrates a somewhat less serious exposure but still one that requires much attention. Contamination of the atmosphere by fume from department A has been practically stopped but we have gone to high-speed grinders which have increased the dust hazard. Additional exhaust ventilation for these grinders is "on order" and some work is planned to determine the size range of the dust in this department. Meanwhile the use of respirators on the dustier operations should help lower the percentage of men in the high and critical ranges.

Department C merits special discussion, for here is a group of men who had essentially the same exposure as those in Department A up until the time this investigation started but since then have had a considerably lower exposure; the average of 1.8 mg. per 10 cubic meters of air shown in Table I has been reduced by the end of this period to well under 1.0 mg. Although 65% of this group is in the normal range of lead excretion it is interesting to note that here the medical survey showed the greatest percentage of symptoms of chronic lead exposure as pallor and lead line. There are two factors which may explain this disagreement between the results of the analysis of spot samples and the medical survey; first, most of the employees are older men who have been in this occupation for a long time as compared with Department A where there is a higher labor turnover, and, second, all of the employees in department C are white as compared with over 50% negroes in Department A—an important factor in the observation of pallor. This group will serve as an excellent example for study of a number of men who, after having been exposed for a long period of time to an atmosphere contaminated with lead fume in excess of recognized safe limits, are now working in an environment comparatively free of exposure.

Department D exhibits a much different set of conditions; here we have another group of white employees, most of whom have seen many years of service in the same location who have not had any high exposures to lead dust or fume up to the time of this survey; practically all of the air samples showed concentrations of well under 1 mg. of lead per 10 cubic meters of air and, although none of the men showed high rates of excretion, 57% are in what we consider the critical range—most of them just over the borderline between normal and critical.

Electrostatic precipitator samples collected one foot above the kettles in which solder and babbitt are melted showed concentrations of lead below 0.50 mg. per 10 cubic meters of air; the solders were tin base and like the babbitts usually melt below 700° F. Now, however, the shortage of tin has necessitated change to many new alloys, all containing considerably higher proportions of lead with the addition of silver and other metals which have raised the melting points considerably. More effective hoods and ventilators are necessary wherever these changes have raised the temperatures and thus increased the vapor pressure of lead.

## Summary

A BRIEF description has been given of the steps taken to cope with a lead hazard which has been chronic for many years but which has developed into an acute condition with the greatly increased rate of operation caused by war conditions. At a time when maximum production is essential, necessary steps, many of them temporary, have been taken to relieve the most serious conditions while all possible permanent improvements were under way. This is by no means the end of the road, for a long-term plan of rearrangement of work and change of methods has been developed which is expected to reduce exposure to lead fume to a minimum. For the present we must rely upon control of general ventilation to keep the exposure within safe limits and upon respirators to protect some men from intermittent peak exposure but plan eventually to change operations and methods so that fume may be collected at the source.

Routine air sampling is continuing and the spot urine sampling procedure has been adopted as a permanent control measure. Thus if any unusual situations crop up we will be warned before serious consequences develop. All of our work on this problem has been done with the idea that the only sure way to cure lead poisoning is to reduce the exposure to as far below the recognized safe limits as possible.

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IN PRELIMINARY tests for determining tellurium in air samples obtained from ferrous foundries, large quantities of iron collected with the samples interfered seriously with determinations done by the usual methods. DR. M. H. KRONENBERG, Chief of the Illinois Division of Industrial Hygiene, reports that the laboratory of his Division has overcome this difficulty by developing a method based upon measuring the light absorption of the precipitated suspension of tellurium by means of photelometer. The method gives reproducible results, within the practical working range—0.05 to 0.7 mg Te.

## HYDROGEL THERAPY IN THE RELIEF OF INTESTINAL STASIS

OF the three indigestible food residues—whose deficiency under modern refined diets constitutes such a common cause of constipation—not all are equally efficient in providing the type of bulk necessary to excite the reflex act of defecation.

Bulk agents high in lignin, for instance, have been found to produce practically no increase in stool volume. And inert cellulose materials of vegetable origin (classed as "roughage") apparently add to the weight of a basal stool merely their own weight, with frequently constipating results.

Hemicellulose, on the other hand, as provided in Serutan, has been declared "much the most effective in increasing fecal bulk and thereby combating constipation."

Primarily the efficacy of such hemicellulose rests on its strong hydrophilic action—its ability to take up and hold large amounts of water against the depleting absorption of the colonic mucosa. This water-binding property invests the feces with a soft bulk that, by colonic distention, invokes prompt defecation. It also insures a plastic consistency that facilitates thorough evacuation without griping.

For such therapy, Serutan has proved highly efficacious in many controlled tests. It is a bland hydrogel, whose principal active ingredient is a hemicellulose specially prepared from the epidermal tissues of plantago ovata, and so treated as to impart a particularly demulcent, unctuous, and *continuous* character to the stool. It contains no irritant drugs of any kind, and is capable of absorbing and holding up to twenty times its weight in water.

Although Serutan in effect adds an emollient quality to the intestinal contents, it causes no anal leakage, nor interference either with intestinal digestion or the absorption of vitamins.

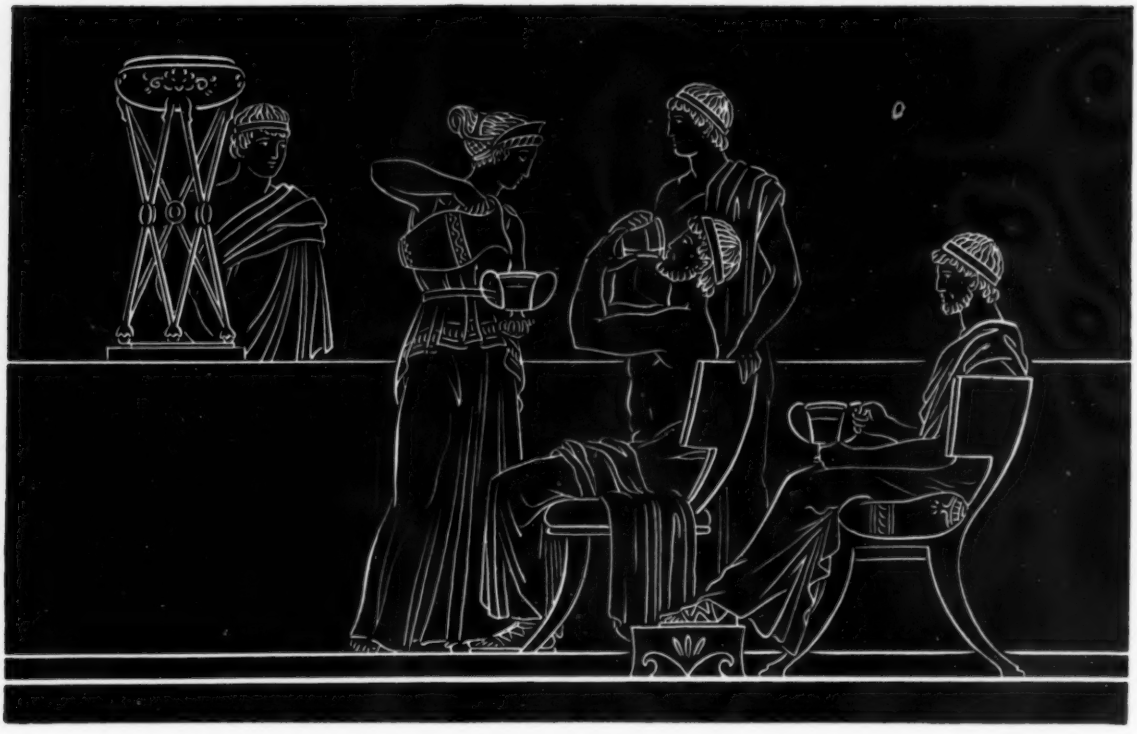
**AVAILABLE:** In 4-oz. or 10-oz. packages, or in 30-oz. hospital size container.

**SERUTAN, PROFESSIONAL SERVICE DIVISION, JERSEY CITY, N. J.**

# SERUTAN

**THE PHYSIOLOGIC AID TO NORMAL EVACUATION**

SOCIAL SCIENCES



# "That men forget all sorrows wherein they pine"

**Nepenthe, which Helen gave Ulysses and his comrades to ease their worries has been lost through the ages. Today CIBALGINE, "Ciba" incorporates hypnotic-sedative effect with antipyretic-analgesic action to give a modern "nepenthe." It can be administered orally, as well as intramuscularly or even intravenously in cases of emergency.**

**While having a wide margin of safety, CIBALGINE* (Dial and aminopyrine) should be administered with all precautions necessary for a product containing aminopyrine.**

# CIBALGINE

FOR RELIEF FROM PAIN, WHATEVER ITS ORIGIN

TABLETS · · ELIXIR · · AMPULS

*Trade Mark Reg. U. S. Pat. Off. Word "Cibalgine" identifies the product as a preparation of aminopyrine and diallylbarbituric acid of Ciba's manufacture.

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